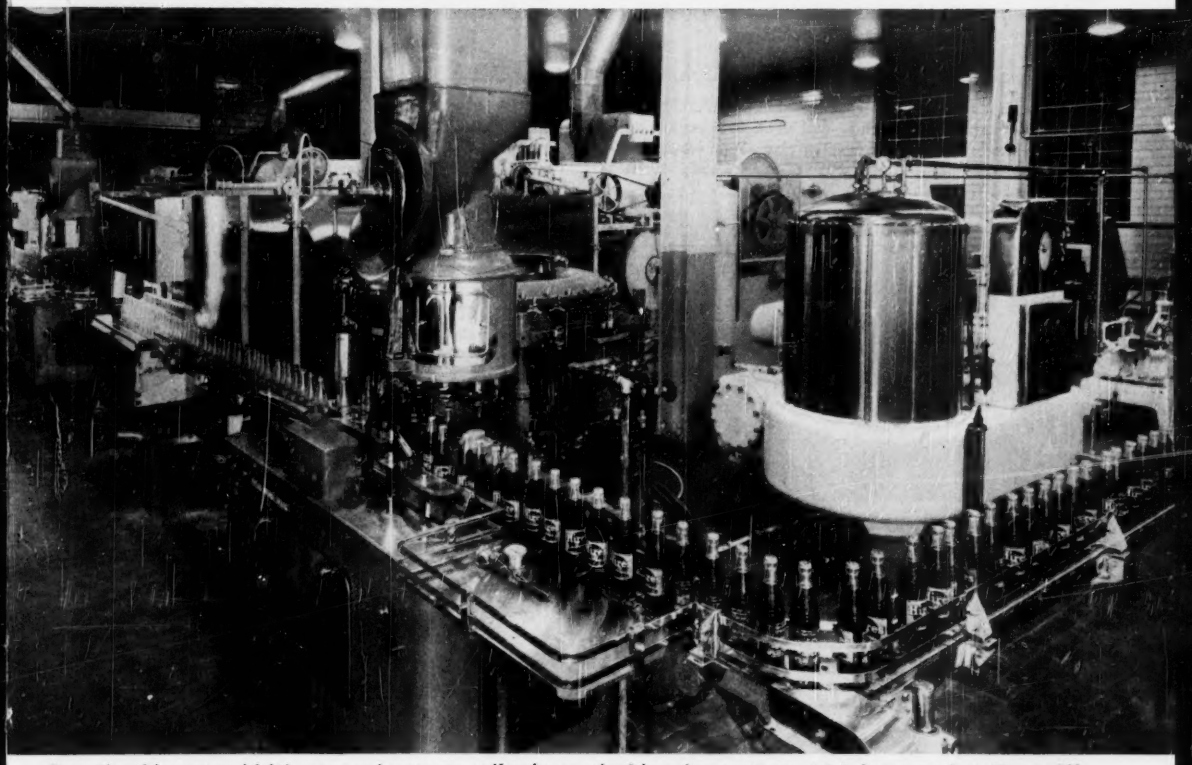
NATIONAL EDITION

Food Industries

For those who control quality and costs through management and production—a McGraw-Hill publication

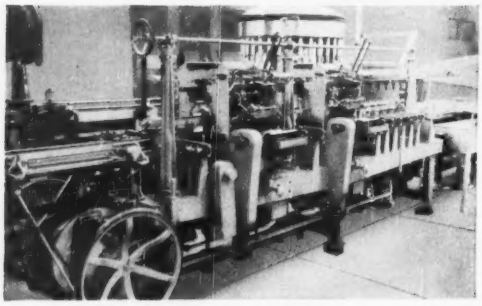


Proportioned by meters (right), syrup and water are uniformly pre-mixed in carbonator in new I.O.A. beverage plant. (See p. 51)

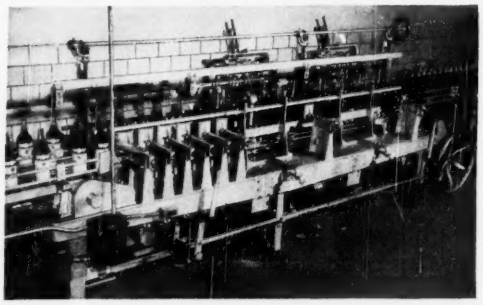
JANUARY, 1950: What's ahead, Cutting costs, Quick-way sanitation, Waste-disposal report, World food outlook, Spurt in frozen foods, Flowsheet

NEWS OF THE WORLD

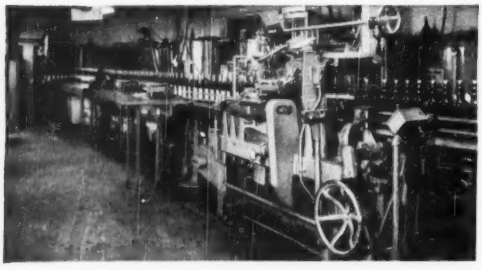
that puts you on the *BEE-LINE* to better labeling.



At WINE GROWERS GUILD, Lodi, California, WORLD BEE-LINE Labelers play a conspicuous part on all three bottling lines in this tile-walled, glass-piped bottling plant. Twin labeling stations provide two-a-second production of trim, smooth, precisely labeled Guild Wine bottles.

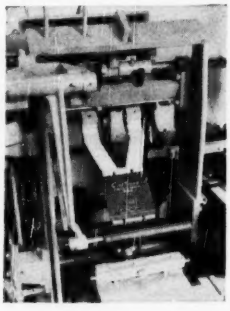


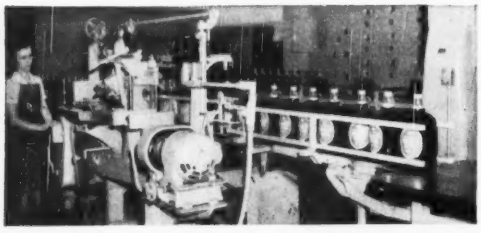
At ITALIAN & FRENCH WINE COMPANY, Buffalo, N. Y., this WORLD BEE-LINE Labeler keeps pace with the lively demand for Old Friar Brand pints and quarts. "Our winery owes much to the World Bee-Line Labeler," says the company. "It reduces operating cost and eliminates breakage. It places the labels spotlessly and precisely on our bottles."



At ESBECO DISTILLING CORPORATION's fine, modern bottling plant, Stamford, Conn., this WORLD BEE-LINE Labeler turns out clean, well-dressed packages worthy of the Corporation's several familiar, time-honored brands.

WORLD BEE-LINE Labeler's new VG METHOD for controlled registration of labels (VG for Vacuum Gripfinger) assures precise positioning of any label from postage stamp size up on flat surfaces or in sunken panels, or of body, neck or shoulder labels, medallions — any combination applied simultaneously.





At PETRI WINE COMPANY, Stockton, Cal., this WORLD Model 40 BEE-LINE Labeler handles the gallon and half-gallon jugs as neatly and efficiently as Petri's Model 135 BEE-LINE handles the smaller sizes.

Many of the world's famous brands of glass packed foods, beverages, catsup and condiments, as well as wines and spirits consider the BEE-LINE the best Labeler in the WORLD. May we send you recommendations and estimates for putting your products on the BEE-LINE to better labeling?

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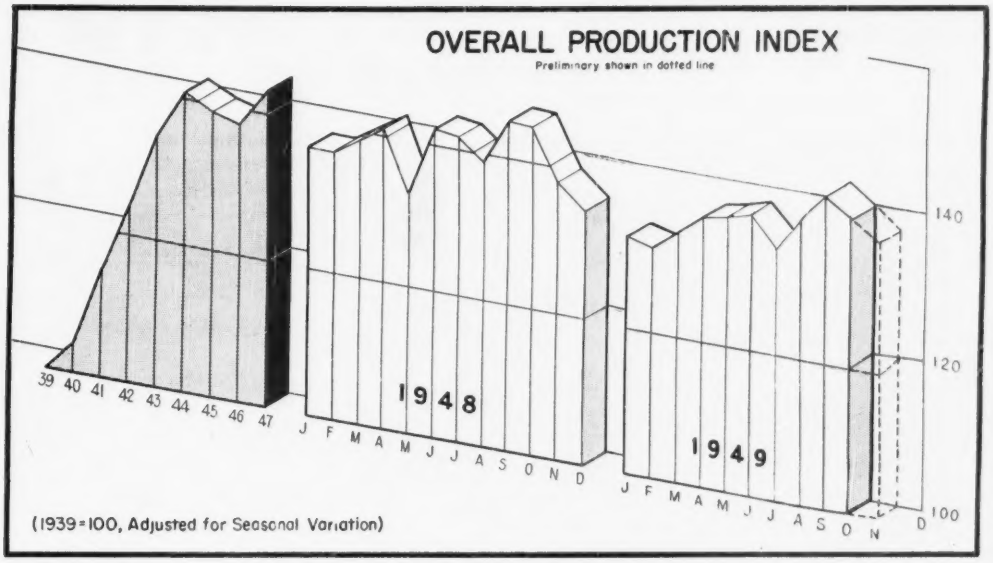
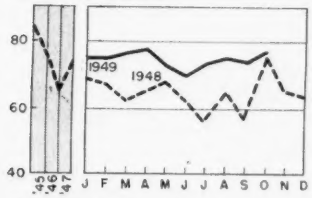
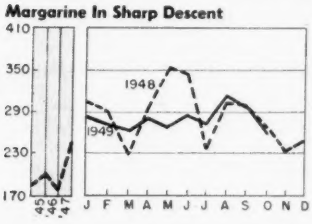
FI Index and Outlook


OVERALL PRODUCTION INDEX
Preliminary shown in dotted line
39 40 41 42 43 44 45 46 47
1948
J F M A M J J A S O N D
1949
J F M A M J J A S O N D
140
120
100
(1939=100, Adjusted for Seasonal Variation)

Butter Starts Climb



Margarine In Sharp Descent



At a Glance—

(1939 = 100, With All Figures Adjusted for Seasonal Variations)

	Oct. 1949	Sept. 1949	Percent Change	Year Ago
Baking	143	147	−3	144
Beverages	170	169	+1	161
Butter	77	74	+4	75
Canning	126	127	−1	143
Cereals	164	163	+1	144
Condensed Milk	169	171	−1	174
Confectionery	147	147	....	148
Flour	124	126	−2	132
Ice Cream	170	172	−1	161
Malt Liquors	174	173	+1	151
Margarine	260	300	−13	274
Meat Packing	149	149	....	160
Sugar, Beet	100	68	+47	111
Sugar, Cane	74	75	−1	72

Butter Output Expected to Rise As Margarine Slopes Off

A DIP to 137 (preliminary) in the overall food output in November continues the decline that set in after September. The final October index of 140 was two points below the previous month, but two points higher than the preliminary estimate for the month.

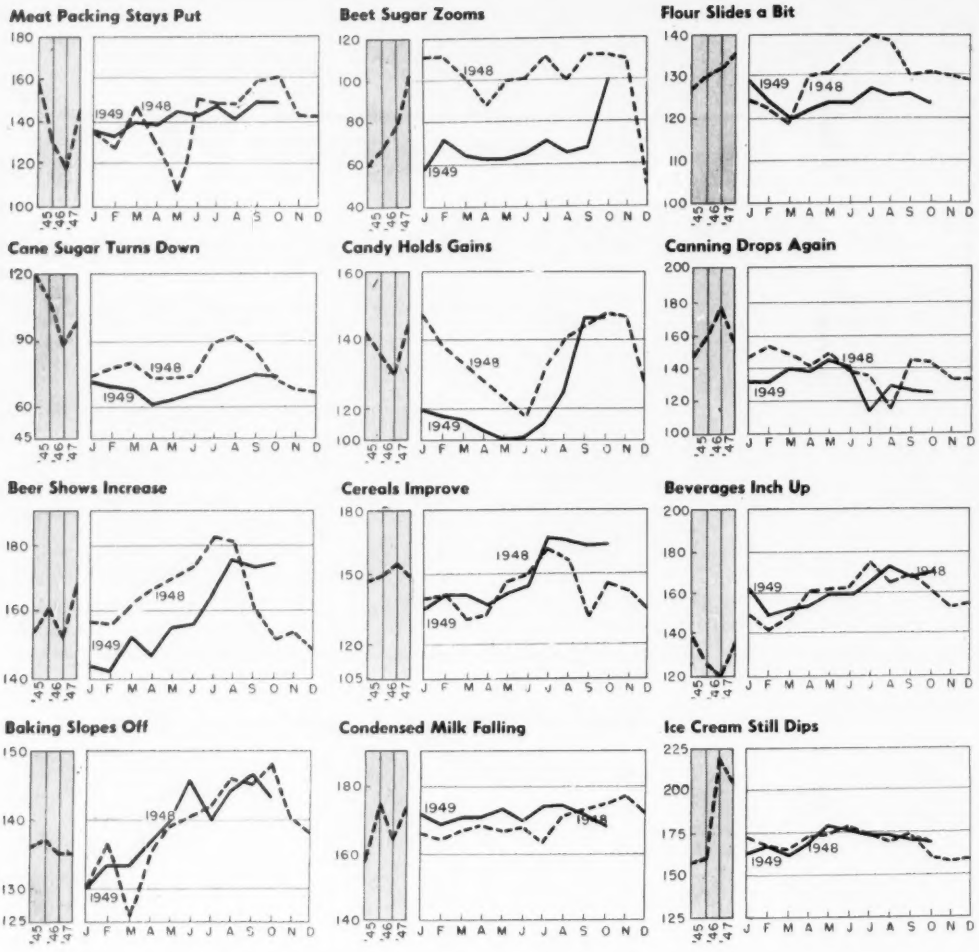
Production of butter is expected to increase in this new year of 1950. One reason is the continuing heavy flow of fluid milk from farms. The surplus of feed grains is resulting in very heavy feeding per cow and higher milk output. Consumption of milk in fluid form has stabilized at about the 1948 level. So any increase in supplies will go into manufactured products.

The market for butter is being maintained at a level that encourages increased production by Department of Agriculture support purchases. Although the Secretary of Agriculture has authority to lower the support price during 1950, he is not expected to do so. Since feed prices may go still lower, despite government support, the present butter price virtually assures a higher milk and butter output next year.

It will be harder to raise production of margarine in 1950 because of a prospective decrease in the supply of vegetable oils. The 1949 crops of soybeans and peanuts were smaller than the year before, and more of the harvest was exported. Another thing: Factory and warehouse stocks of edible oils are now the smallest since 1936.

This low inventory position results from both exports and continued high consumption of the principal fats and oils by food processors. With vegetable oil supplies being cut, the advantage will be with processors who make use of animal fats, such as butterfat and lard. Hog slaughter will continue to rise in 1950, adding considerably to lard supplies.

The heavy output of lard and butter is expected to raise total fats and oil production in 1950 above 1949, despite the expected drop in production of vegetable oils. Total output of the edible fats and oils group in the twelve-month period between October 1949 and September 1950 is forecast by the Department of Agriculture at 8,800,000,000 lb., just above the 8,700,000,000 lb. produced during the season recently ended. Prices have already skidded, anticipating the rise in production. The BLS index of wholesale



prices of 26 major fats and oils (excluding butter) fell to 135 in November. That compares with 148 in October and 238 in November, 1948. But some further price decline is likely if production continues up.

Big Citrus Pack

The present citrus-fruit pack may well top that of last season. Supplies of canned citrus juices at the beginning of the current packing season were the lowest in several years. Supplies of frozen concentrated orange juice are higher than a year ago. But this undoubtedly reflects the necessity for carrying higher stocks in order to accomplish the much wider distribution now taking place. Consumer acceptance of the frozen orange-juice product has become widespread. And a large market is also foreseen for other concentrated juices.

Total cold storage holdings of frozen fruits, berries, and fruit juices on November 1, the last reported date, were 4 percent smaller than a year earlier. Meanwhile, the market for frozen fruit products has been expanded by additions to the number of retail outlets carrying these products. Considerable further expansion along this line is possible. Little more than a third of the half-million retail food stores handle a full line of frozen foods. Less than two-thirds carry any frozen foods.

Among the long-range factors that may lead to an increase in the number of retail outlets handling frozen fruits and vegetables are: 1) more extensive wholesale distribution to stores in rural areas, 2) lower cost of freezer cabinets, 3) greater consumer demand as the result of advertising, and 4) better retail profit margins on frozen foods. This would lead retailers to devote floor space to these items at the expense of other products.

FOOD INDUSTRIES is published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder; James H. McGraw, Jr., President; Curtis W. McGraw, Vice-President and Treasurer; Eugene Duffield, Senior Vice-President, Publications Division; Nelson Bond, Vice-President and Director of Advertising; Joseph A. Gerardi, Secretary. PRICE: 35c per copy. Subscription rates: U.S. and possessions, $3 for 1 yr., $4 for 2 yrs., $5 for 3 yrs. Canada, $4 for 1 yr., $6 for 2 yrs., $8 for 3 yrs. (payable in Canadian or U.S. funds). Pan American Countries, $5 for 1 yr., $8 for 2 yrs., $10 for 3 yrs. All other countries, $15 for 1 yr., $25 for 2 yrs., $30 for 3 yrs. Indicate position and company on subscription orders. Subscriptions invited only from food processing executives, engineers, technologists, operating supervisors, consultants and laboratories. EDITORIAL AND EXECUTIVE OFFICES: 330 West 42nd St., New York 18, N. Y. Cable address: "McGraw-Hill, N. Y." Address correspondence regarding subscriptions to J. E. Blackburn, Jr., Vice-President and Director of Circulation. PUBLICATION OFFICE: 99-120 N. Broadway, Albany 1, N. Y. Entered as second class matter Aug. 26, 1948, at Albany post office under Act of Mar. 3, 1879. Return postage guaranteed. Member A.B.P. and A.B.C. Indexed monthly in Industrial Arts Index. Copyright 1950, by McGraw-Hill Publishing Co., Inc. All rights reserved.

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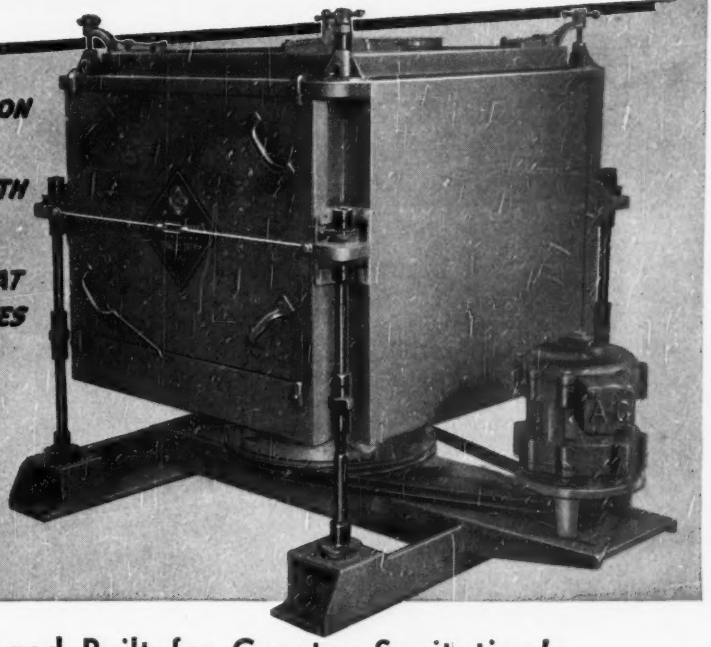

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The Talk of the Industry

Half-Baked Idea Catches on Quick

We mentioned the new half-baked rolls in "Highlights" last month. Meantime this intriguing new product, called "brown 'n serve" by General Mills, has aroused surprising interest among bakers.

Since you will be hearing a lot about the product, perhaps you would like to know how it came about. It is the result of a one-man bakery operation and a fire.

A small baker near Tampa, Fla., had a batch of rolls in his oven one night when the fire-siren sounded. Being a member of the volunteer fire department, he had to leave his bakery unattended. Rather than let the rolls burn while doing his civic duty, he took them from the oven half baked.

Then when he returned from the fire, he put the rolls back into the oven and finished the bake. Next day, the batch was delivered to the stores, and the rolls were sold, eaten and enjoyed.

This chain of events sparked an idea in the head of the baker. Why not sell half-baked rolls? Then the housewife could put them in a hot oven for a few minutes and serve fresh hot rolls to her family.

So half-baked rolls went on the market in a small Florida town. And pretty soon, General Mills learned about it, acquired and perfected the know-how, and passed it on to bakers.

Nuts and Stones and Fish and Bones

Sometimes one gets the answer to a problem from a surprising source. Take the codfish canner whose number-two grade contained pulverized bones and was too high in calcium content to suit the Food & Drug Administration. What to do? This product really represented the canner's profit. But too much labor was required to pick the meat from the bones.

With the supply of meat-covered bones piling up in the refrigerated storage room, the situation soon became acute. Then one day, while attending a packaging equipment show, the canner saw stones being separated from peanuts by an air-gravity-vibration classifier which had been "borrowed" from the mineral industry. If stones from peanuts, why not bones from codfish meat? That hunch paid off.

After some adjustments to meet the special conditions, the classifier did the job effectively and fast. And that second-grade product which made the difference between profit and loss was saved.

Efficient Retort Loading—Three Ways

Various ways of saving labor in loading and unloading retort baskets were seen in our recent visits to canneries. One of the neatest is a magnetic can loader. In an Eastern plant, one of these is hooked up with photocell control. Cans pass the electric eye as they travel on end down a conveyor and onto a rotating disk the diameter of the retort basket.

As the cans crowd onto the disk, they move toward the center until the disk is solidly filled. Then the electric eye, having counted the correct number of cans required to fill the disk, stops the movement of cans along the conveyor and automatically puts the loader into action through a relay. The loader head lowers, picks up the cans by magnetic lift, moves them over the basket, and lowers them into it.

Something not so neat, but quite efficient, is an operation in a Midwestern plant. Cans pass through a filler and closer at a rate of about 200 minute. Then they move along a short length of conveyor and drop directly into a retort basket. To reduce denting, the fall of the cans is broken by a home-made slide. It consists of a piece of conveyor belting riveted along the sides to two lengths of strap iron with bent ends which hook over the edge of the retort basket.

Still another Midwest cannery uses a hydraulic lift to load glass jars into retort baskets without breakage. Each basket has a false bottom, permitting the lift to come up to the top of the basket. A perforated steel disk is placed on the lift, and jars are fed onto the disk from a conveyor. Then the lift is lowered until the tops of the jars are even with the top of the basket. Another disk is placed over the jars to accommodate the next layer, and so on until the basket is full. Unloading is the reverse of this procedure.

Couple of Angles on Canned Milk

In the event you have been hearing about the Valparaiso, Ind., experiments with canned fresh milk, we should like to point out a couple of angles on this process. First, it has not yet reached the stage where it is ready for commercial application. Second, its practicability is somewhat limited by the requirement that the milk be handled under vacuum from cow to processing plant. It is believed that the latter restriction limits the method to areas where there are very large dairy farms, as in California.

Hors d'Oeuvres

■ Large quantities of thiamin in the diets of nursing mothers may produce brighter-than-normal offspring. Lacking thiamin, mom is flirting with the possibility of rearing a dope. Anyway, that's what tests with rats appear to indicate. Hope they can prove at least the latter. There are times when all the present explanations are hopelessly inadequate.

■ The U. S. had a lot of headaches before it joined the two oceans at Panama...And although the chain does less than 7 percent of its industry's business, the Justice Department is damned if its going to let A&P have a closer alignment even in name.

■ Montana No. 1, another meat-type hog, is described at some length by *Farm Journal*. And then they tell us "the hogs are good foragers, they're quiet, and they make good mothers." Darn shame they are hogs.

■ After the San Jose city councilmen, in weighty debate, decided that stapling wrappers on French bread would do no harm, they discovered they had no authority to pass such an ordinance. Then they heard themselves called nincompoops by the baking industry. Often wondered what was a nincompoop.

■ Two USDA researchers say the "milk veins" and "milk wells" on a cow's abdomen and the network of surface veining on the udder apparently have little or nothing to do with her milk producing abilities. Cheer up! Maybe bags under the eyes and wrinkles don't mean anything, either.

J.A.J.J.

LINK-BELT *Screw Conveyor*
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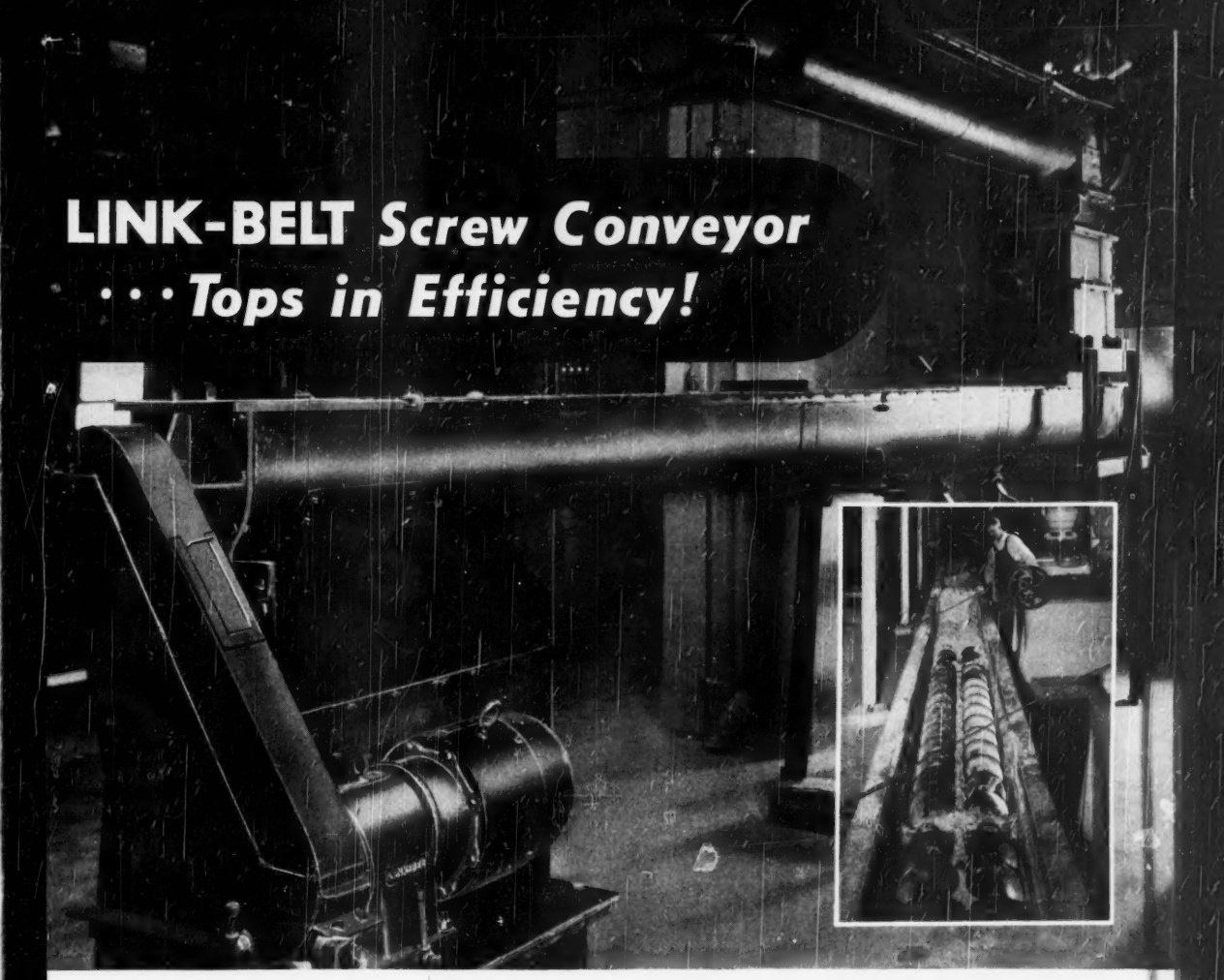

Bulk materials handling reduced to its simplest terms is represented by Link-Belt screw conveyor. Applicable to a wide variety of handling jobs it is the preferred method in thousands of plants in greatly diversified industries. Simple in construction, with a minimum number of moving parts, it is easy to install, economical to operate, requires negligible attention or upkeep.

Compact, it occupies less space than other types of conveyors; has no return run.

Dust-tight, it protects contents against waste or contamination.

Adaptable, it operates at any angle, and will perform mixing, blending or feeding operations with elevating, lowering or horizontal conveying. Note inset photograph showing parallel flights of opposite hands, in common trough.

Link-Belt Company originated and is the largest producer of Helicoid continuous rolled conveyor flighting. Link-Belt screw conveyor is also made in sectional form, in a wide range of diameters, gauges and pitches, and in various metals.

Link-Belt engineers invite your request for information or assistance in planning efficient low-cost screw conveyor installations. Contact our nearest office.

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TYPES OF LINK-BELT CONVEYING MACHINERY

Belt Conveyors	Apron Conveyors
Screw Conveyors	Oscillating Conveyors
Bulk-Flo Conveyors	Flight Conveyors
Chain Conveyors	Bucket Elevators
Trolley Conveyors	Bucket Carriers

LINK-BELT COMPANY Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 3, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

LINK-BELT

CONVEYING MACHINERY

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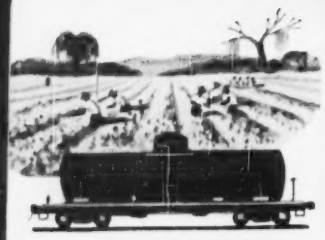
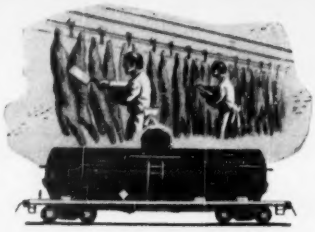


COTTONSEED OIL



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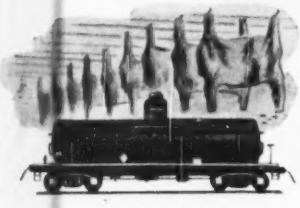

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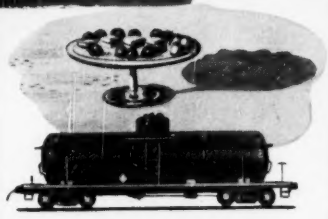
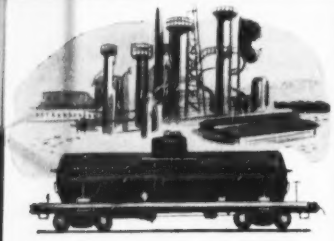
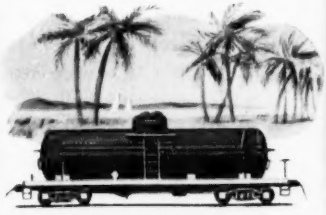


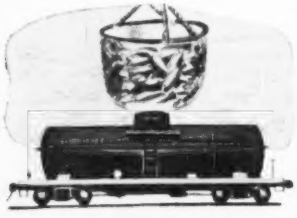
CORN SYRUP UNMIXED



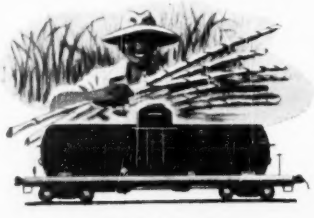
CORN OIL



COCONUT OIL



FISH OIL



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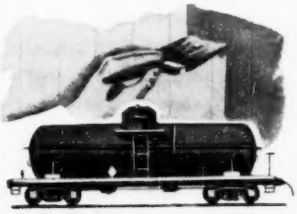

TUNG OIL

What Washington Thinks

THE SMALL CUSTOMER—For some time Horlicks Corp. and Federal Trade Commission have been arguing about the prices of malted milk products, which FTC says, include "price discrimination and unlawful use of exclusive-dealing contracts." There is no question that there are price differentials. But Horlicks' reply to the government emphasizes that the so-called favored customers could not exist at all if they did not get bulk shipments that they could sell under private brands, and that many small enterprises exist only because they have such private-labeled stocks for resale in their natural trade areas. There is a great difference of opinion between the Commission and the corporation as to whether the differentials are properly related to the difference in cost of manufacture and sale to different types of customers. Ultimately that issue may be the one that determines whether the present pricing practices may be continued or not.

A COW AS A FACTORY—Uncle Sam's experts of the Department of Agriculture present an interesting index of efficiency for cows. Milk cows in certain dairy improvement associations produced an average last year of 8,675 lb. of milk containing 350 lb. of butterfat. In contrast with this, all cows in the United States produced an average of only 5,036 lb. of milk and 201 lb. of butterfat. This is quite persuasive evidence that herd improvement makes the cow a much more efficient milk manufacturer.

BUTTER PROBLEM—We quote Secretary Brannan: "Through support operations at 90 percent of the present parity price, the government has accumulated almost 100,000,000 lb. of butter. Already, we have a tremendous disposal problem." The Secretary sounds worried. We would be, too, if we had his job of undertaking to subvert the law of supply and demand. And we are reminded that there are more votes from housewives buying butter, than from the farmers who sell it. Since the Secretary is an astute politician, it may be that this relationship will sooner or later change his attitude toward price support. But not soon, definitely not.

". . . AND EXECUTIONER"—Any company can profit by thoughtful consideration of the following statement of the president of du Pont. "To me it seems a simple axiom that those companies which gain the approval of their customers through supplying satisfying goods and service will grow and prosper. Those which are less favored will grow and prosper to a lesser extent. It is the customer, in the last analysis, who is judge, jury, prosecutor and executioner."

We in the food business know what it means when our goods do not please and the public becomes "executioner." We hope that the members of Congress who heard Mr. Greenwalt's statement understand now that service, and not size, determines profit and prospect for an individual firm.

RESEARCH EMPHASIZED—Public Health Service is definitely organizing the research program which is an essential part of its effort to alleviate water pollution conditions. These conditions threaten materially to reduce the value of natural water supplies both for industrial use and for public supply. Technical men of the food business concerned with these problems will do well to become personally acquainted with Louis F. Warrick, who is the senior sanitary engineer in charge of these matters at the Washington headquarters of PHS.

CONGRESS RETURNS—This month members of the House and the Senate resume attention to legislative problems. All bills and committee projects that were underway on adjournment three months ago can be picked up just where they were laid down. This January is not like the one of an odd numbered year when a new Congress begins. On those occasions all unfinished bills have to start over again.

WARPED DATA—In our planning for 1950 it will be important to figure on 1949 operations with considerable care. Government summaries, on which many of us base forecasts and plans, do not always spotlight adequately the irregularities, like those of 1949. Remember that there was a serious slow down, partly psychological and partly the result of steel and coal strikes. As business resumed with a boom late in the year, restocking of shelves as well as holiday buying made up some of the deficit of earlier months, and business was generally above normal. All hope that production and sales schedules for 1950 will not be depressed or expanded by this type of abnormality. But no one can guess what new abnormality we may meet this year. Whatever the conditions are, single-month comparisons with the like month last year are not reliable.

AIR POLLUTION—One of the most comprehensive air pollution studies ever made was conducted at Donora, to determine the causes and consequences of the "unusual smog episode of October 1948." Fortunately, food technologists will not have to make a detailed study of this report (published as Public Health Bulletin No. 306). However, we can find in it a splendid guide to methods of investigation and a considerable aid in forecasting official interpretations of air pollution problems. Any firm in the food business, which may either cause air pollution or be suffering from someone else's pollution of the air, will do well to become familiar with this comprehensive document (available from Superintendent of Documents, Government Printing Office, Washington 25, D. C. for $1.25).

PRICE FACTORS—Bottlers of carbonated beverages have been analyzing the factors that contribute to the price of sugar. When the food consumer buys a pound of sugar he pays about 9.5c. for it. Of that retail price 1.98c. is made up of "artificial cost" items imposed by Federal legislation, the bottlers say. The U. S. excise tax paid by the refiner is 0.535c. The import duty or tariff is also 0.535c. The price increase caused by the premium of U. S. price over world price through import restrictions is calculated at 0.91c. The logical conclusion is that American consumers, both food factories and housewives, pay more than 20 percent of their sugar bill because of so-called "protective legislation." One wonders who is supposed to provide protective rules for the sugar user.

DIFFICULT CHOICE—In the tolerance hearings there are bound to be some cases in which demand for very low limits on spray residues will almost certainly compel acceptance of certain foods, tomato puree for example, with some insect fragments. As one trade executive put it, "If we are to eat certain foods at all, we will have to consume small quantities of either insects or insecticides."

—R. S. McBride, Washington, D. C.

HIGHLIGHTS

Malthus and his world-can't-feed-itself followers are repudiated by a leading agronomist, Vincent Sauchelli. Food production not only can be greatly increased on land now farmed, but tremendous new areas can be cultivated. These possibilities Mr. Sauchelli demonstrates statistically. Maybe it won't be necessary to plow under people after all. (See article.)

Trust-busting has been losing ground in public opinion ever since A&P began blasting the government. That is the feeling in Washington, and is believed to be prime reason behind new committee to figure out ways of getting industry to better understand antitrust policies and to follow them without court action. Who says business cannot gain public support?

It looks like a 10 percent increase in frozen food sales for '49. Piled upon a 6½ percent climb in 1948, this marks a significant trend. Quick-frozen quality and expanding outlets are the prime causes, but the skyrocket rise of frozen concentrated juice deserves credit too. (See article.)

Snow Crop has dropped its controversial distribution system for frozen foods. For two years it operated wholesale branches, and it gained experience upon which to base its policies in respect to wholesalers. It "assures" distributors a profit, yet keeps prices down to increase volume. Just what the industry needs more of – if system really works.

Something revolutionary in pumps has been invented. Its impeller is a rotating helical tube with a gradually increasing diameter. It won't clog because the small end is as big as the inlet pipe. Fruits – and even hard-boiled eggs – have been put through it with only occasional slight damage. A nice trick. (See Equipment section).

Use of nitrogen blanket in processing is proposed for apple juice plants. The purpose is to prevent oxidation and discoloration of the apples between pulping and pressing. This idea may bear fruit in other food processes. (See article.)

Strawberries should be quick frozen to 0 deg. F in 15 minutes or less to minimize leakage and give top quality. A result of research at Georgia Tech, this bit of knowledge resolves a long-standing question. (See article)

In order to bring the study of the nation's food laws into proper focus while spotlighting their implications and shortcomings, the Food Law Institute has been established. Supported by many leading food processing companies, the Institute is headed by Charles Wesley Dunn, long-time legal authority for GMA. It is a long step in a new direction, and a lot of good is almost certain to result.

Researchers have come up with some things meat prepackagers ought to know. Different types of packaging materials have different effects on quality. And certain antioxidants can check the change of color in fresh meats. Prepackaging is not simple. (See article)

Radio frequency pasteurization of cheese made from raw milk has been achieved by three Cornell dairy scientists. Method makes possible pasteurization after wrapping, with enough bacteria and enzymes left to develop flavor. Cheddar, ripened by this method, has scored high in flavor and dairymen are optimistic about further development.

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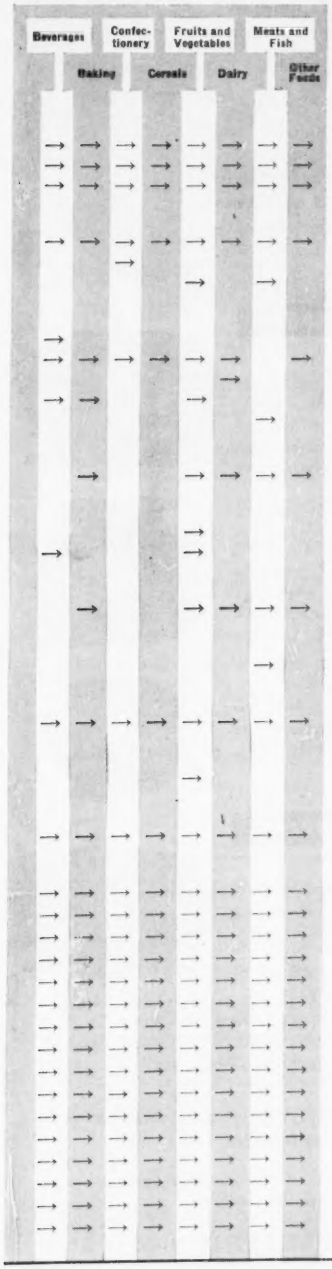

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Type SC—OPEN PROTECTED—Form J, general purpose motor—meets the needs for most installations where operating conditions are relatively clean and dry. The top half of the motor frame is closed to keep out falling solids or dripping liquid.

Type SC—SPLASH PROOF—gives the necessary protection where plants must be washed down—keeps water out of the motor even when a hose is applied directly on the frame. Also provides protection against rain, snow, sleet and ice for outdoor installations.

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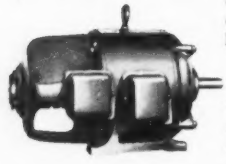
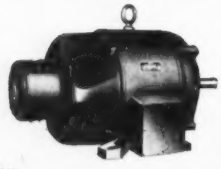
Type SC—EXPLOSION PROOF protects against atmospheres charged with explosive dusts or gases. They carry Underwriters' label for specific kinds of hazards.

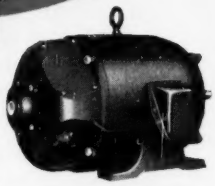


Type SR—SLIP RING—wound rotor motors are suitable for applications requiring low starting current with high starting torque, reversing, or adjustable speed.



Type SY—SYNCHRONOUS MOTORS—suitable for continuous operation at a uniform load for power factor correction.

SINGLE PHASE



Type RS—REPULSION START INDUCTION—single phase brush lifting motor suitable for applications requiring high starting torque with low starting current.

Type CSH—CAPACITOR START INDUCTION—single phase motor suitable when high starting torque with normal starting current is required.

Type SP—SPLIT PHASE, INDUCTION—single phase motors—suitable for light starting duty.

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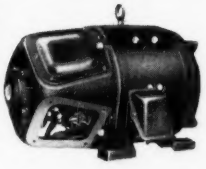

Type DN—DIRECT CURRENT MOTORS—suitable for use where direct current is available or its use desirable.

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2. Compare materials of construction, mechanical design and workmanship. For example, welded construction is stronger than bolted and more sanitary.
3. Ask for a list of users and check with them.
4. Compare prices in relation to all factors. All "bargains" are not necessarily the lowest priced.

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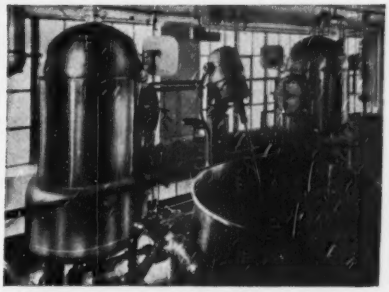
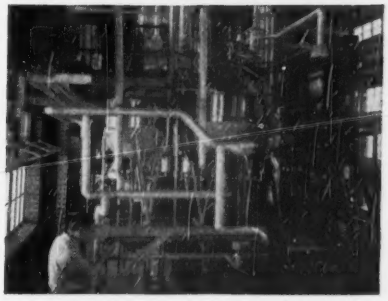
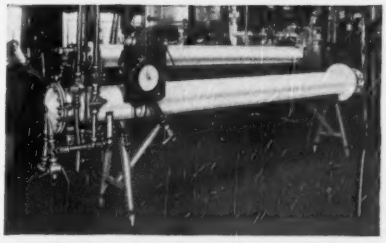


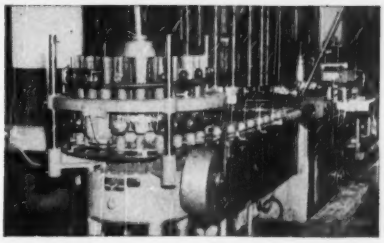
Vacuum process equipment for juices, fruits, paste, jams, jellies, syrups, etc.



Mixers and cookers for tomato products, soups, syrups, salad dressings, candy, etc.



Heat exchangers for cooling and for heating liquids.



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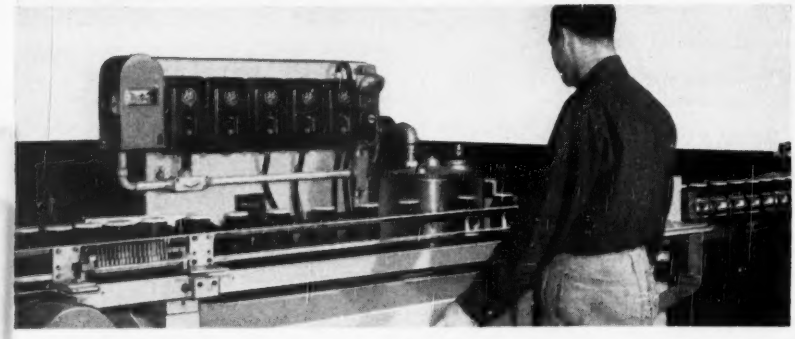

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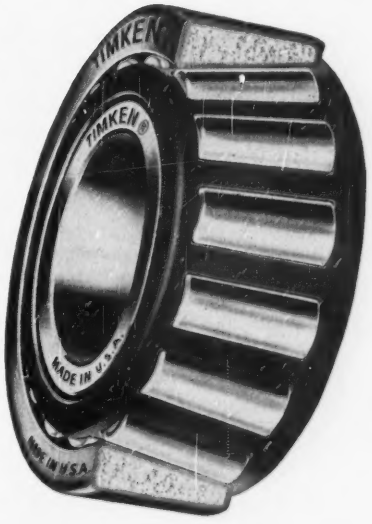

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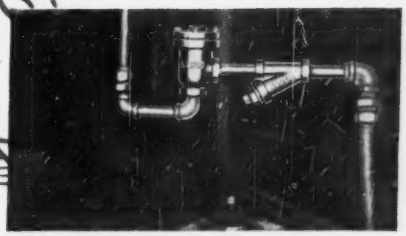
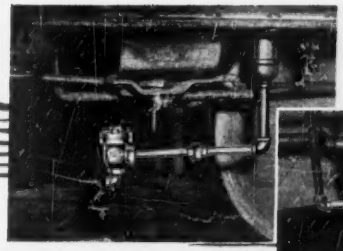
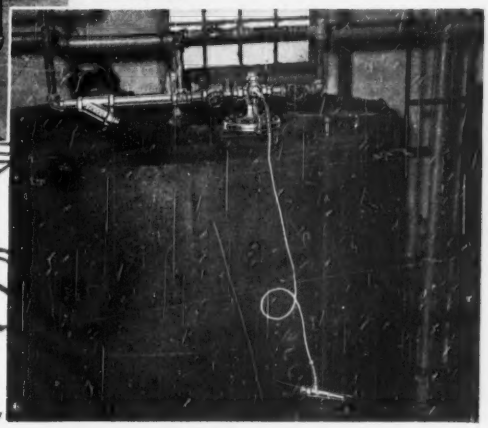


Sarco No. 9 Thermostatic Traps and Strainers drain coils in tanks in large oil tank farm.



No. 9 Trap used for tank cars.

Sarco 2430 controlling temperature of large tank in ammonia plant.



UNLESS YOU HAVE CORRECT STEAM TRAPPING AND CONTROL

And these hogs eat heat 24 hours a day—every day and twice as hungry during the winter months.

But here is a loss you can eliminate forever over a week-end. Put on the right kind of Sarco Steam Trap and you will know that all coils are warm all over and that all possible heat has been used before the condensate is released. See illustrations above.

If temperatures must be uniform, ask about the Sarco 87 Trap Control—an inexpensive device that holds temperatures within a few degrees and cannot freeze.

If temperatures are critical, use the 2430 Control shown at the right which will hold within a degree, day in and day out.

You can be sure that any combination of traps and controls recommended for your job by Sarco will make the liquid flow easily in winter or summer, prevent losses from overheating and withall use less steam than you are using now.

ASK FOR INFORMATION ON TANK CONTROL

"No. 9" The accepted standard for thermostatic trapping is wide open when cold and cannot freeze. It uses all possible heat before condensate is released.

Regulators The Sarco 2430 is shown above. This is a pilot operated, dead end valve with positive shut off on no load. Available up to 300°, pressures to 175 psi. A complete line of Sarco Controls covers every purpose.

87 Trap Control Thermostatic liquid expansion type used for open and closed tanks, outdoor tracer lines and in other forms for food and chemical process control. Bulletin Nos. 250 and 500.

259

SARCO SAVES STEAM

SARCO COMPANY, INC.

Represented in Principal Cities

Empire State Building, New York 1, N. Y.

SARCO CANADA, LTD., TORONTO 5, ONTARIO

IMPROVES PRODUCT QUALITY AND OUTPUT

Out Ahead Again FOR 1950!

New "Weight-Saving" Diesel Tractors • New Middle-Weight Six-Wheelers
New Power and New Features in Light and Medium Duty Models

Once again GMC leads the truck transport parade . . . once again GMC introduces improvements in design and function . . . once again GMC widens the scope of truck performance and truck usefulness.

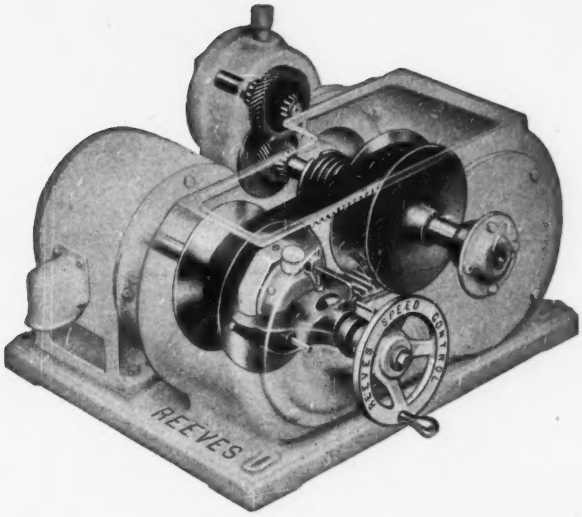
For 1950 there's a new heavy duty 2½-ton "470" series . . . two new "400" and "620" series six-wheelers . . . two new "weight-saving" Diesel-powered tractors built to handle maximum legal payloads in the 45,000-55,000 pound weight range . . . a new 1½-ton "280" series of 11,000 pounds GVW.

These new models combine to offer GMC power, dependability and economy to many more operators . . . and all along the line GMC's move even further out in front. New camshafts, valves and manifolds step up the power in light-medium models. Wider seats, more headroom and improved sealing increase their cab comfort. And there are new chassis features, including new hydraulic and optional air brakes on 2½-ton models, new front springs with airplane-type shock absorbers on light trucks. Your nearest GMC dealer has complete facts. See him soon.

Processors and distributors of meat and foodstuffs will find a model ideally suited to their hauling needs in the GMC line which ranges from 4,600 pounds GVW to more than 90,000 pounds GCW. For example, GMC's new 1½-ton "280" models, and new 2½-ton "450" and "470" series and new "weight-saving" Diesel-powered tractors are especially well adapted to food transport jobs.

GMC
GASOLINE • DIESEL
TRUCKS

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION



CHAMPIONS – In the Field of Cost Reduction

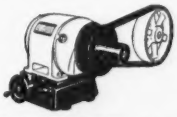
In almost every industry, in thousands of factories and shops all over the world, certain machines are rendering championship service—performing unusually difficult jobs as if they were routine, and familiar every day jobs with greater ease and precision, because they are equipped with accurate, variable speed control —REEVES Speed Control.

They are handling materials of widely varying consistency, weight, hardness and temperature . . . steel, textiles, rubber, foods, plastics, glass pharmaceuticals and many others. They are stamping, grinding, shaping, turning, winding, spreading, cooling, buffing, conveying and so on . . . some under the direction of skilled, experienced operators and others in the hands of awkward newcomers. But this they have in common: *all* 265,000 of these machines are equipped with REEVES Speed Control . . . *all* are performing each and every operation at exactly the right speed to get the best from man, material and machine . . . *all* are proving, through their day-after-day performance, that REEVES holds the key to improved production—cost-wise and quality-wise! They are proving that any good machine can be a champion—when equipped with REEVES Speed Control. Write for complete new catalog FD16-3N-

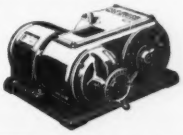
REEVES PULLEY COMPANY • COLUMBUS, INDIANA
Recognized Leader in the Specialized Field of Speed Control Engineering

THE THREE BASIC REEVES SPEED CONTROL UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

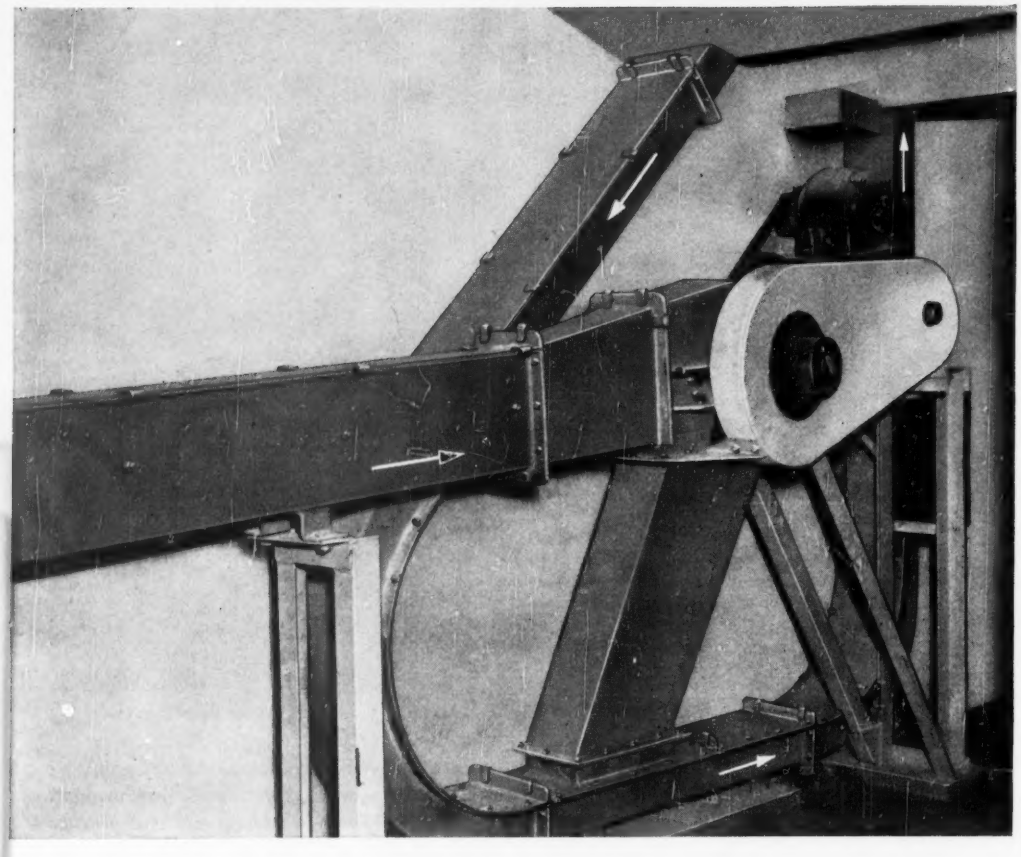


VARI-SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 10 hp.



MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 20 hp.

Accurate Variable
REEVES Speed Control
Gives the Right Speed for Every Job!



MANEUVERS MACARONI

"without spillage or spoilage"

Semolina and flour, principal ingredient in macaroni, must move quickly, without spillage and with freedom from danger of contamination, from initial storage through sifting to processing. Here's an S-A designed system that met every requirement and in addition was so compact it fitted into existing structures with a minimum of alterations.

Any powdered, granular or flaky food ingredient can be handled faster . . . cleaner and at lowest cost in an S-A REDLER or ZIPPER belt conveyor system. Years of experience with the bulk handling problems of the food industries and a complete line of conveying equipment enable S-A engineers to recommend the one best system for handling materials at low cost in your plant.

Check now with S-A engineers about how to best handle your bulk materials. There's no obligation on your part for their recommendations. Write today.

VIMCO MACARONI PRODUCTS CO.
CARNEGIE, PA.

Semolina and flour are drawn from initial storage bin by an L-Shaped REDLER conveyor-elevator and delivered to gyratory sifter on floor above. A 50-ft. long REDLER conveyor picks up sifted material chuted to floor below and delivers it to a 66-ft. high REDLER which elevates it five floors to roof. Then, a 68-ft. long REDLER conveyor takes material next door to a horizontal closed-circuit REDLER which feeds a battery of eight storage tanks above presses and processing equipment.

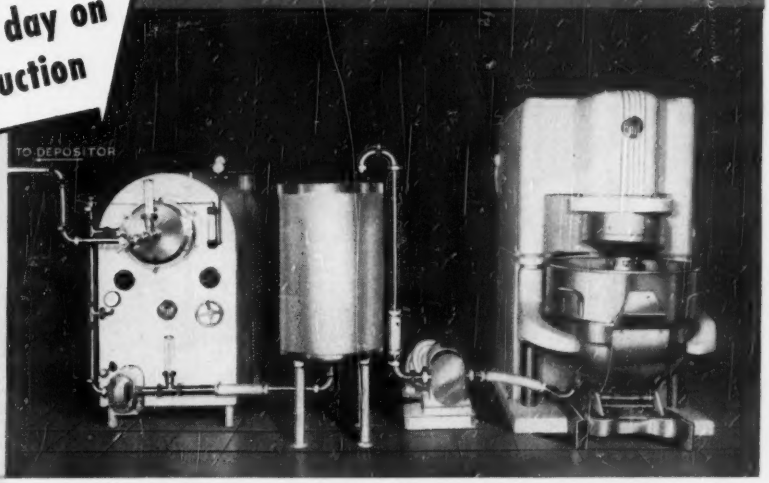
STEPHEN S-A DAMSON MFG. CO.

6 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif. • Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

The AMF OAKES is for YOU

If you mix 5,000 lbs. of batter or more per day on varied production



AMF OAKES MIXER ⬅ STORAGE TANK ⬅ PUMP ⬅ AMF GLEN MIXER

Typical Glen Oakes layout. Other one and two-floor combination, can be made to suit your plant layout.

FEATURES

- BETTER QUALITY
- MORE STABLE MIX
- GREATER YIELD
- MORE UNIFORMITY
- BETTER KEEPING QUALITY
- LITTLE ATTENTION REQUIRED
- SANITARY
- EASILY CLEANED
- LESS MAINTENANCE

A TYPICAL OAKES DAY

Type of Cake	Running Time
SHORTENING BATCHES	
Loaf Cake	20′
Rings	20′
Layers	30′
SPONGE BATCHES	
Jelly Roll	30′
Small Layer	11′
Large Layer	11′
Rings	30′
CHOCOLATE BATTERS	
Cup Cakes	30′
Layers	12′
Sandwiches	11′

With production capacity of up to 30,000 lbs. on varied production in an 8-hour day, the AMF Oakes Continuous Automatic Mixer proves its value on much smaller production.

QUICK CHANGEOVER from one type of batter to another meets every demand of the baker for VARIETY in cake production. It is *not necessary* to have long continuous runs to use the Oakes efficiently. (See chart of a Typical Oakes Day.)

It takes LESS THAN 2 MINUTES to change over the Oakes from sponge to pound or from pound to chocolate batters.

It takes only 15 minutes from the time you stop depositing chocolate batter until you start depositing light batter.

VARIABLE CAPACITY Production is variable from 500 to 4,000 lbs. per hour according to the capacity of your ovens. A single foot pedal controls the flow into the depositor.

One man with automatic equipment for scaling flour and sugar can scale, premix and deliver to the depositor 3,600 lbs. per hour. (Without automatic scaling 3,000 lbs. per hour.)

Write to Mr. T. R. Stevens for literature and complete specifications.

AMERICAN MACHINE & FOUNDRY COMPANY

485 FIFTH AVENUE, NEW YORK 17, N. Y.

West Coast Sales and Service Headquarters, 1253 Mission Street, San Francisco 3, California

Stainless steel works miracles only when the *right* type is matched to the right application. Crucible, a pioneer in the development of stainless steels, offers the services of our unsurpassed metallurgical staff to help you make the right choice.

And Crucible produces a complete range of sheet and strip in gauges, grades and finishes from ½″ to 60″ inclusive, as well as all other forms: plates, bars, tubing, forgings, wire and castings to meet your specific requirements. Data sheets are available on request. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, New York.

CRUCIBLE first name in special purpose steels

hot and cold rolled **STAINLESS SHEET AND STRIP**

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

A WHOLE NEW CONCEPT OF INSTRUMENTATION

BASED ON BROWN *Electronik* CONTROL

IS REVOLUTIONIZING THE FOOD INDUSTRY

FROM COAST TO COAST

A LOT of changes are being made in food plant engineering . . . and a lot of quality conscious processors are turning to Brown creative instrumentation as a basic tool for the further development of production techniques and economies.

Creative instrumentation—the engineered application of cost-reducing instruments and controls—has earned the respect and confidence of food men in every section of the country. But this is only the beginning! The revolution continues to gain momentum as, almost daily, new *control systems* are engineered by Brown to make processes more profitable in commercial operation.

A unique combination of men, ideas and experience with Food Industry problems is at your service . . . to engineer a *control system* specifically suited to your purpose! Call in your local Honeywell representative for further information, today . . . he is as near as your phone!

BROWN INSTRUMENTS — WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL — BELFIELD VALVES

MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION
4502 Wayne Ave., Philadelphia 44, Pa.

Offices in 73 principal cities of the United States, Canada and throughout the world

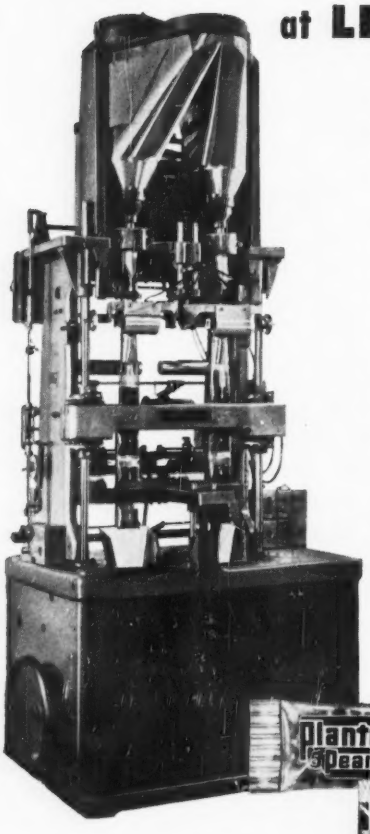
MINNEAPOLIS Honeywell — *Creative Instrumentation* FOR THE FOOD INDUSTRY — BROWN INSTRUMENTS

TRANSWRAP

THIS READY-MADE BAG, HAND-FILLED
Approximate Cost
Labor and Materials
$7.00 per thousand

THIS *AUTOMATIC* TRANSWRAP PACKAGE
Approximate Cost
Labor and Materials
$3.29 per thousand

AUTOMATICALLY produces a better-selling package at LESS than HALF THE COST



TRANSWRAP—industry's most practical and efficient packaging machine—forms, fills, seals and delivers a better-looking, better-selling package for your product . . . completely automatically.

In cost, the *finished filled* TRANSWRAP units actually run less than half the price of ready-made *empty* bags for manual processing. And, because a single operator can handle a whole battery of TRANSWRAP machines, wage savings are phenomenal.

TRANSWRAP is equally efficient for powders, solids, tablets and even liquids. Standard packaging materials which may be used include cellophane, Pliofilm, glassine, roll foil or other suitable heat-sealing materials. Package capacities range up to 80 cubic inches in volume and often may exceed one pound in weight. Custom-engineered adaptations are possible to meet your individual requirements with maximum efficiency.

Model "B" Transwrap with auger feed. Also adaptable to Volumetric or liquid feed. Produces 40 to 75 pkgs. per minute.

Also Available—
Model "A" Transwrap
For small and unit packages.
(2⅜" x 6" Max.) Speeds to 150 pkg/min.

WRITE FOR FREE ILLUSTRATED BROCHURE

Manufactured and Sold by

TRANSPARENT WRAP MACHINE CORPORATION

Route 17 and Henry Street, Hasbrouck Heights, New Jersey

REPRESENTATIVES IN PRINCIPAL CITIES OF THE U. S.

YARWAYS make it hot for "CHILI"

Marlo Packing Corporation, San Francisco, specialize in making delicious chili con carne . . . and they rely on Yarway Impulse Steam Traps on cooking kettles to get that chili hot!

Getting equipment hotter, sooner—and keeping it hot—is the job Yarway Impulse Traps specialize in wherever steam traps are used.

When steam is turned on, Yarways open wide and discharge condensate continuously so that operating temperature is quickly reached. Then, under lighter condensate loads, Yarways discharge at short intervals to *keep* equipment at peak efficiency. Other Yarway features—small size, easy installation, straight through piping, low maintenance, only one moving part, low price.

Call your nearest Mill Supply dealer for Yarway Impulse Steam Traps and Yarway Strainers today.

FREE TRAP BULLETIN T-1739 ON REQUEST

YARNALL-WARING COMPANY
127 Mermaid Ave., Philadelphia 18, Pa.

Yarway Traps and Strainers on cooking kettles at Marlo Packing Corp.

YARWAY IMPULSE STEAM TRAP

taste it!····
smell it!····

Sampling tells the story!···

When all your lab tests on SUPERSOY have been made, we urge that you confirm your own findings by the old fashioned smell-and-taste test. In SUPERSOY oils, you'll find the most perfect *balance* of desirable qualities ever achieved!

ARCHER-DANIELS-MIDLAND COMPANY
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Mail This Coupon Today!

Please send samples of SUPERSOY "S" and "C" soybean salad and cooking oils, with specifications and prices.

Name _____

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1

it's ADM Supersoy

The **new** soybean salad and cooking oils!

from the nation's largest processor of oilseeds

IF you've ever wondered just how good soybean oils could be made . . . how perfectly sweet and bland and pleasing to the palate . . . here's how to find out. Just let us send you samples of ADM's two new super-refined soybean oils—and see for yourself!

SUPERSOY "S" is our salad oil. It is refined, deodorized and winterized in an ultra-modern new ADM plant at Decatur, Illinois by continuous process. We believe that SUPERSOY "S" sets new standards of perfection—in purity, flavor, uniformity and flavor retention. Your comparisons are invited.

SUPERSOY "C" is our cooking oil. It is made by the same processes, in the same all-new refinery, and is backed by all the research, the experience and resources of ADM . . . nation's largest processor of oilseeds.

There is much exciting news about these superb new soybean oils . . . news that will interest every chemist, plant manager and food executive. To learn this news the fastest way, *send for samples* of SUPERSOY. The coupon at the left will bring them . . . and we'll also send specifications and price information. Fill in and mail the coupon now!

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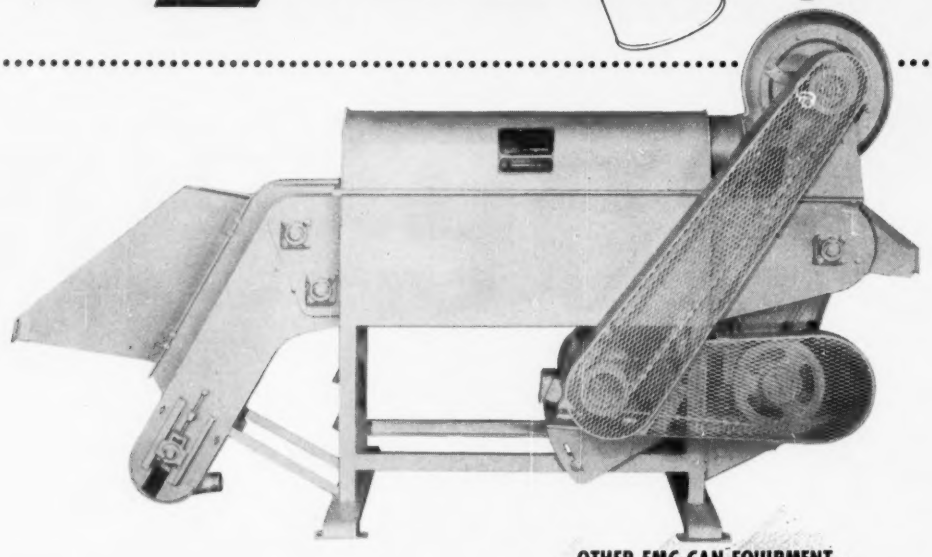
ARCHER-DANIELS-MIDLAND COMPANY • MINNEAPOLIS, MINNESOTA

NEW *fmc* Air Blast Can Dryer



- **requires no heat**
- **saves space**

Consider the advantages of this new FMC Air Blast Can Dryer:

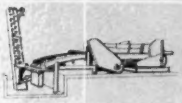
- Efficiently dries cans with no re-heating.
- Can be installed in the small space of only 30 inches by 9 feet.
- Provides maximum efficiency with high capacity.

FMC Air Blast Can Dryer permits immediate labeling and casing—no "cooling off" period is required. Be sure to get full details today.

OTHER FMC CAN EQUIPMENT

FMC KYLER-LABELER

FMC NON-SHOCK CASER



FMC CAN UNSCRAMBLER

FMC SHIPPING CASE SEALER

FMC UNIVERSAL CAN WASHER

FMC LIGHT WEIGHT CAN DETECTOR

Write for full information or contact your nearest FMC representative.

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FOOD MACHINERY AND CHEMICAL CORPORATION

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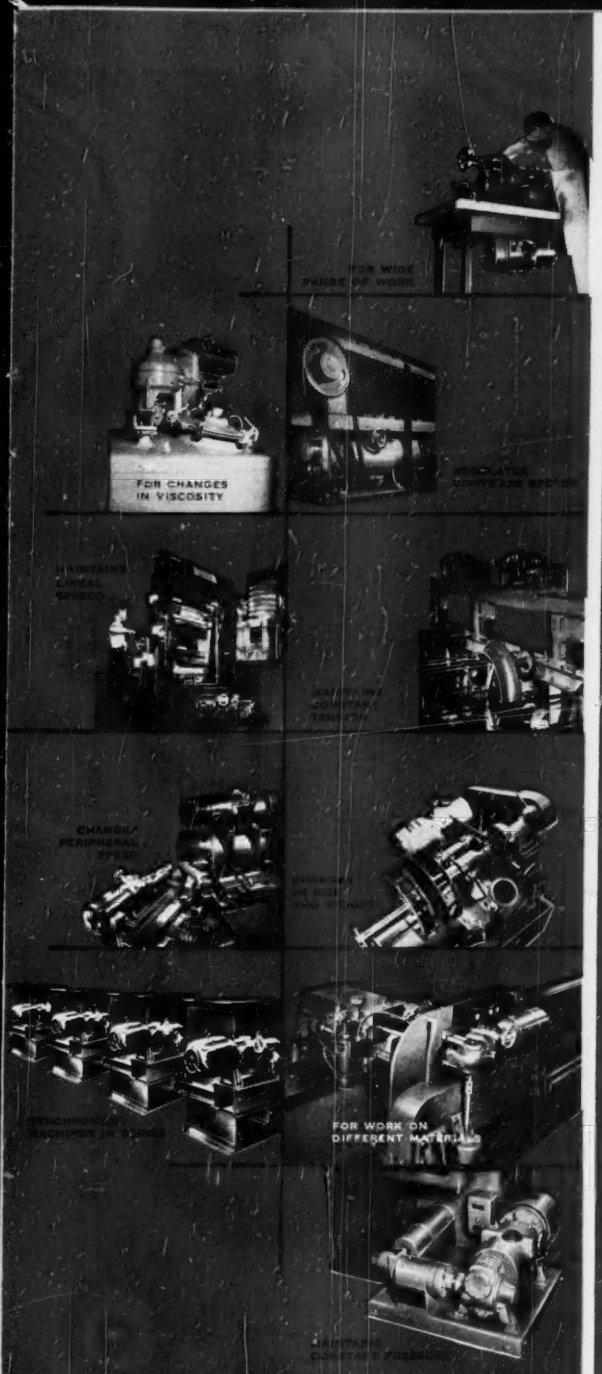


again and again

variable speed operation

makes a good job better

Better because variable speed operation pays off in higher rates of production, a more uniform better quality product and more efficient performance of your equipment and your operators.

And you can make the job better still by using Master Speedrangers because the all-metal construction of these variable speed drives makes them extremely compact and durable . . . more flexible and adaptable to a wide range of uses. They're available in sizes up to 5 horsepower with speed ranges up to 12 to 1 in most sizes.

Write for descriptive booklet Data 7525 and see how Master Speedrangers can help you get better results on material processing, handling and conveying equipment . . . mixers and agitators . . . machine tool drives . . . testing and calibrating equipment and many other applications.

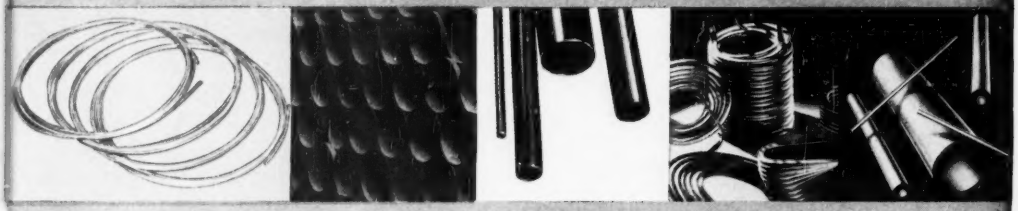
THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

MASTER SPEEDRANGERS

TRENTWELD TUBING DOES IT BETTER!

Whatever your tubing requirements may be, investigate TRENTWELD. Made in a *tube* mill by *tube* experts, TRENTWELD is machine-formed, machine-welded and machine-sized for uniformity. Tested cold rolled stainless sheets are completely fused into finished tubing *without* added rod metal. Developed by Trent specialists, this method results in tubing that is metallurgically correct, and has a uniform section . . . with no zone of weakness for corrosion to attack.

Our manufacturing methods and modern facilities permit us to supply TRENTWELD Tubing in a complete range of tube sizes from ⅛" to 22" diameter in long lengths or up to 30" diameter in shorter lengths. Whatever your industry,



there's TRENTWELD Tubing to fit your design. Our years of experience as tube specialists is at your call. Write us full details about your application.

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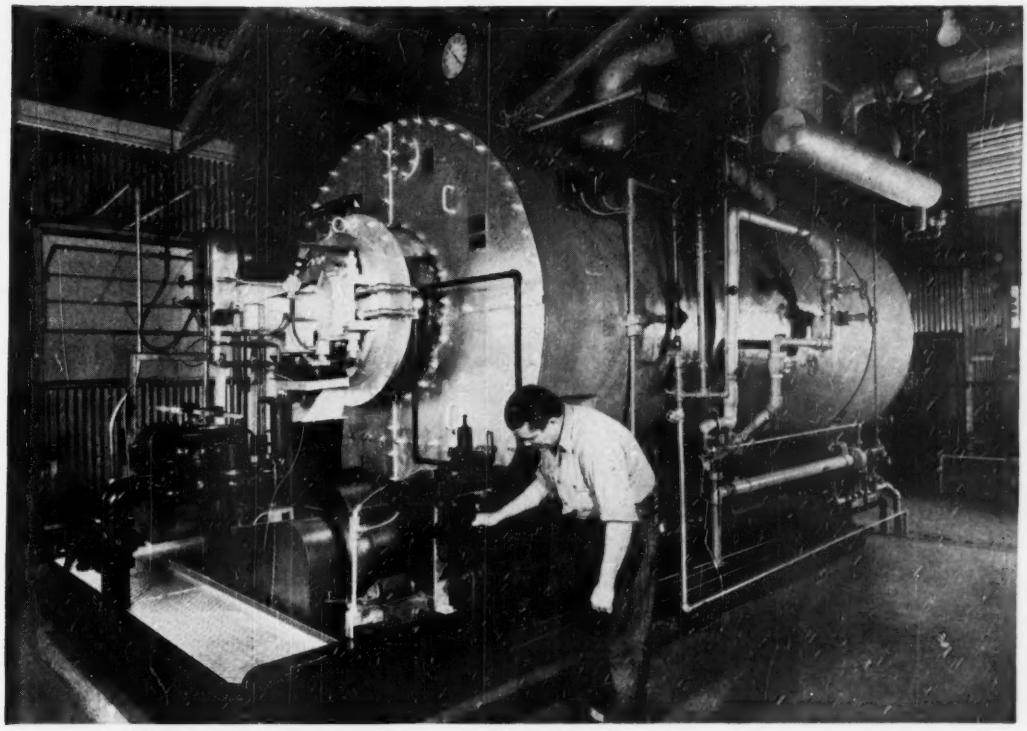
TRENTWELD

STAINLESS STEEL TUBING

Boiler HORSEPOWER Isn't Enough



Modern Boilers must have EARNING POWER, too

BECAUSE the cost of generating steam — for processing, production or heating needs — demands a substantial share of your operating budget, you can't afford to be complacent about your boiler.

If you want to cut fuel and maintenance costs, look to your boiler. Look beyond boiler horsepower ratings and rate your boiler in terms of its *earning power* for you — its ability to deliver steam at lowest cost.

For any boiler installation (15 to 500 HP.) — new or replacement — Cleaver-Brooks offers these immediate and long range cost saving advantages:

A Custom-Planned Boiler Engineered for Your Needs: Your steam needs and steam-using equipment are studied — your present total steam load plus your estimate of future expansion are considered — with this information the size of Cleaver-Brooks boiler best suited to your specific needs is determined.

Factory Starting Service: Your boiler is placed in operation by Cleaver-Brooks factory service-engineers. Your operators are trained in operation, care and maintenance.

Flexible Operation Burning Gas or Oil With Equal Efficiency: You can use oil, gas, or combination oil and gas, whichever is of lower cost. Through high heat transfer, Cleaver-Brooks boilers operate at a guaranteed efficiency of 80% from full load down to 30% of rating.

In addition, Cleaver-Brooks boilers give you clean, smokeless operation — eliminate fuel and ash handling — require no high or costly stacks — no special foundations — fit under low headroom—provide quick steaming, flexible operation to meet fluctuating loads — fully meet all codes.

Available in sizes 15 to 500 HP., 15 to 200 P.S.I. — write for Cleaver-Brooks steam boiler bulletin.

CLEAVER-BROOKS COMPANY
352 E. Keefe Ave., Milwaukee 12, Wis.

WRITE on your business letterhead for Steam Cost Calculator — a ready reference slide rule showing comparative steam costs when using oil, gas, or coal as fuel. Mailed on request—no obligation.

Cleaver-Brooks
STEAM BOILERS

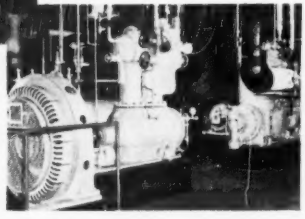
in frozen-juice processing, too, G-E drives help "keep it continuous"

Direct-mounted on a refrigerator compressor at Vacuum Foods is a 100-hp G-E synchronous motor for maintaining exact speeds and correcting power factor. Its control panel (above) is typical of many G-E controls in the plant that help keep operations flowing smoothly.

For reliable performance and close quality control, G-E equipment is used practically throughout at Vacuum Foods

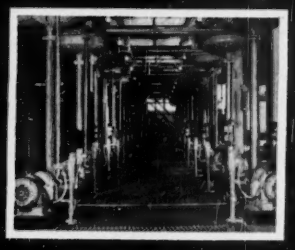
Here's an example of a food plant that decided to "go continuous" right from the start. It's the Vacuum Foods Corporation plant at Plymouth, Florida, processing Minute Maid frozen orange-juice concentrate. As many others have done, it turned to General Electric to supply and co-ordinate practically all its electric equipment. Now this plant, too, knows how G-E motors and control can help keep a processing line running at top capacity, contribute to uniform product quality.

If *you* are planning on "going continuous" to reduce handling costs in your food plant operations, it will pay you to check first with a G-E sales engineer. Backed by a staff of engineers specializing in the food industries, he can help you obtain the many advantages of continuous processing methods at lowest cost—by efficient application of G-E motors and control. Call him at your nearest G-E office. *Apparatus Dept., General Electric Company.*

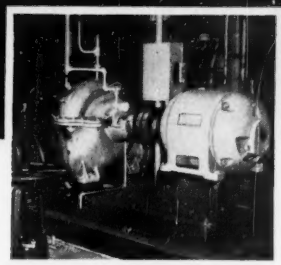


Food Plant Drives

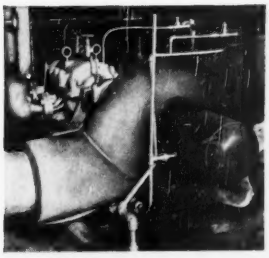
GENERAL ELECTRIC



Pumps shown here that circulate juice at high speed through a vacuum evaporation system are driven by a group of 2-hp G-E totally enclosed fan-cooled motors. In cast-iron construction that resists corrosion, and protected against dripping or splashing liquids, these sturdy motors require only a minimum of maintenance.



With 3500 gallons of water per minute needed, pump motors must be especially dependable. This 75-hp G-E Tri-Clad open (dripproof) motor, one of many throughout the Vacuum Foods plant, provides a high degree of service continuity in driving pumps for the water circulating system.



Here, a 40-hp G-E mechanical drive turbine drives one of the plant's boiler feedwater pumps. For food plants using process steam, G-E turbines provide a reliable, low-cost machine drive while also acting as a reducing valve to furnish low-pressure process steam.

G-E Battery Chargers for electric trucks

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At the Vacuum Foods Corporation plant in Plymouth, Florida, frozen orange-juice concentrate is moved quickly and continuously by means of electric battery trucks. To help insure the uninterrupted service needed for top-capacity production, the plant makes extensive use of its G-E copper-oxide battery-charging equipment. Among its many advantages that have "sold" Vacuum Foods are these:

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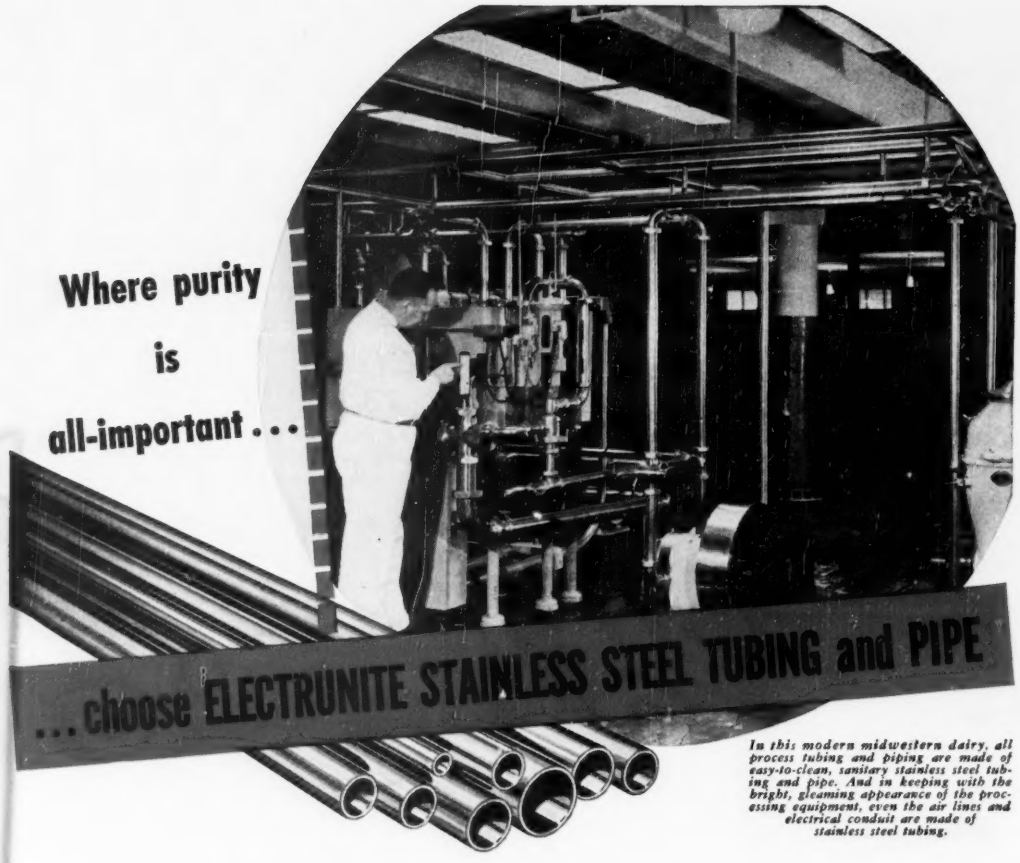

In this modern midwestern dairy, all process tubing and piping are made of easy-to-clean, sanitary stainless steel tubing and pipe. And in keeping with the bright, gleaming appearance of the processing equipment, even the air lines and electrical conduit are made of stainless steel tubing.

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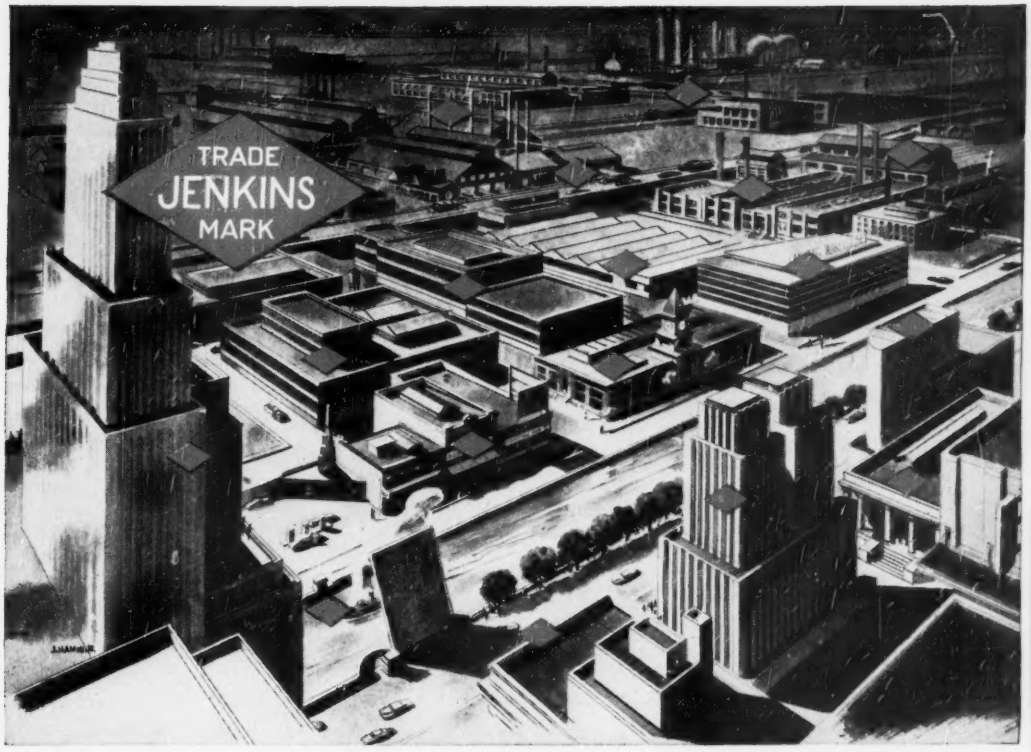

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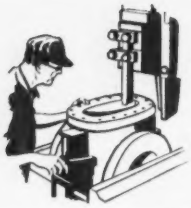

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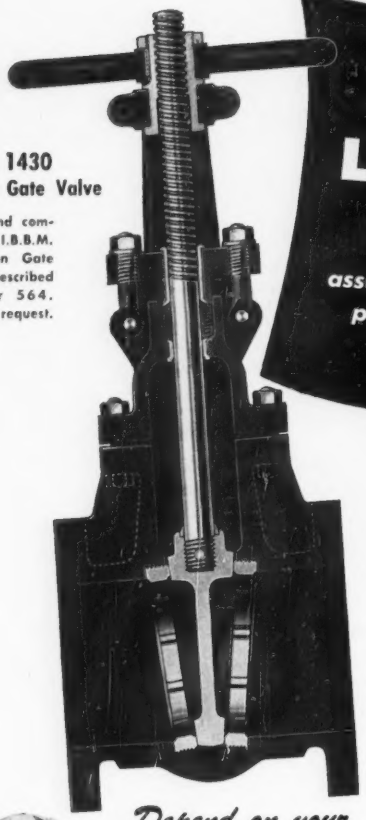

Fig. 1430
Iron Body Gate Valve

Fig. 1430 and complete line of I.B.B.M. and All Iron Gate Valves are described in Circular 564. Mailed upon request.

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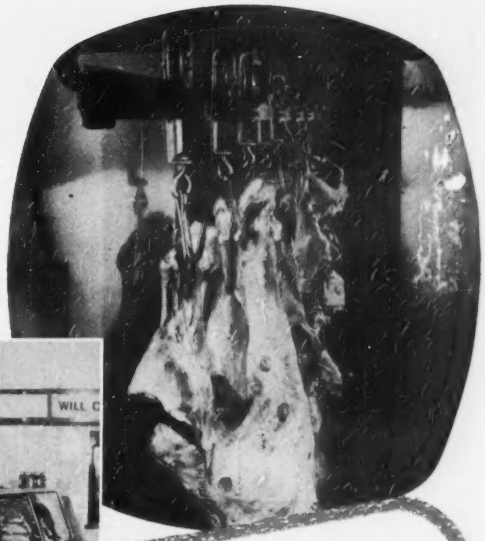

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JANUARY, 1950

Food Industries

What's Ahead for Food Processors in 1950

It is interesting and often useful to look ahead at the turn of the year. And unless our crystal ball is cracked, we see many significant trends and developments in the food processing field during the next 12 months.

Economic Outlook—The trend to increased consumption of processed foods may be expected to continue as a result of increasing population and steadily greater acceptance of processed foods. Consumer buying power should be as high for the first half of 1950 as it was in the last quarter of 1949. Uncertainties cloud the forecast for the last half of this year.

Raw Materials—The complex problem of insecticide residues will be in the limelight because of the F&DA hearings. Processors must cooperate sincerely in these proceedings if decisions are to be reached which will protect consumers and be fair to growers and processors.

With long storage of surplus grain, insects will become more of a problem in the milling and baking industries. And there will be a trend to pneumatic handling to reduce the number of places in which insects can develop.

Mounting surpluses will tend to push prices down for many commodities. This will threaten the price-support program and perhaps force the government to give surpluses to needy countries.

Product Formulation—This year is likely to be significant in respect to official decisions regarding the addition of so-called chemical ingredients to foods. The bread standards will set some precedents. It is not unlikely that a move will be made to amend the Food & Drug Act to require that a new ingredient be proved harmless before it is used.

Technology—More research will be done on cold sterilization by X-rays, antibiotics, ultrasonics and electron bombardment. But little more than research findings are likely. Continuous heat sterilization of fluid foods, coupled with aseptic filling, will gain more headway.

Renewed efforts will be made to lick chocolate bloom by specially tailored emulsifiers. New attempts will be made to mix bread dough continuously. Work will continue on canning fresh milk and on churning butter continuously. Dehydrofreezing might come into use before the year's end.

The mass spectrometer will be applied to food research, and likely will prove a useful new tool. Radioactive tracers will be used in a small way to study such problems as the collection of bacteria in pipe lines and equipment.

Engineering—Alert processors will engineer a lot of labor out of plant operations. And they will apply more automatic process control to increase through-put and improve quality. Emphasis will be placed on better materials handling, and many installations of pneumatic conveyors for free-flowing bulk materials will be made. Straight-line production will come even more into the picture, and sanitary plant and equipment construction will receive much attention.

Packaging—Steady growth of prepackaging can be counted upon, along with improvement in package design and selection of wrapping materials. More meat packers will put sausage and luncheon meats into self-service packages, and it will be surprising if some small local packers do not prepackage fresh meats.

Higher speed machines for filling and sealing cartons and flexible containers will come into use. Wider application will be made of some of the newer plastic films, including polyethylene, the vinyls and Saran. Vacuum and gas packaging in flexible containers will gain.

Distribution—More will be done in the way of processing and packaging products for institutional users. Such labor savers as prepeeled and sliced potatoes will find larger markets. Coin-machine vending will gain because of low-cost and spot-location features. High freight rates will increase the use of motor trucks and will cause more companies to acquire plants near now-distant markets.

Waste Disposal—Pressure on the part of the federal, state and local officials will force elimination of waste nuisances. This will result in the development of new byproducts from non-edible materials.

Management—Progressive executives will do more to improve labor and public relations. Workers must be taught that they are a part of a production team, that private enterprise has no equal as a business system, and that a welfare state is impracticable.

Progressive processors will tell the public about their place in the life-line of America. And they will explain how low their profits really are.

Government—Food processors will suffer attacks by government agencies and Congressional committees. Department of Justice action against A&P and the big meat packers will highlight this activity.

Year of Progress—While this will be a year of headaches for food processors, it will be one in which wrestling with problems will result in progress. Those who keep up with the parade have little to fear—except, perhaps, gray hair and ulcers.

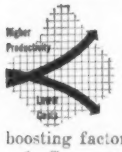
—F. K. LAWLER, *Editor*

Plug Those Cost Leaks

Here is a working formula for finding and correcting faulty operations. It starts at top management and sweeps right on down the line

AUREN URIS and JOHN H. KOSTMAYER

Respectively, Editor, Human Relations Division and Editor, Industrial Relations, Research Institute of America.



Food industries, more than many types of business, currently face a double cost squeeze. They are up against four expense-boosting factors.

1. Government-support of farm prices, that puts a rigid floor under the cost of agricultural raw materials.

2. A continuing high, and in some cases increasing, expense of labor and overhead.

3. Rising transportation costs.

4. Tougher competition within the industry, demanding increased outlays for advertising and promotion.

Two important factors work toward lower prices:

1. An increase in general competition, forcing price concessions in order for the industry to maintain its share of the consumer dollar.

2. A generally sagging consumer price level, backed by a consumer psychology that *expects* lower prices.

The total effect adds up to high operating expense on one hand, and pressure toward lower selling prices on the other. It is the kind of major management dilemma that calls for thought, planning—and action.

Faulty Effort

But it is the critical nature of the problem that, of itself, often makes for failure in dealing with it. The situation seems to call for bold steps. The mere fact that a step is bold, and therefore often looks good on the surface, tends to satisfy the sense of urgency as well as accomplishment. Here is the mistaken kind of effort that such pressure often brings about:

The top member of the firm moves into the driver's seat. He spends days, nights and weekends in a fierce tussle with the facts and figures. He consults with one or two of his key people, gets the benefit of their views. The result of this study he sums up in two words: "Reduce budgets!"

And budgets are cut—a drastic 10, 15, 20 percent across-the-board slash. The effect is immediate. The company's cash outlay goes down measurably. But the next accounting period reveals another fact. Production has fallen off *more than proportionately*. Total expenditure has been cut, but *unit cost has not*. The failure is explained in the results of this cost-cutting effort in two departments:

Department A, a key department that bottlenecked the entire production setup, needed an increased budget to be able to function at top efficiency. More personnel and new equipment were essential. The budget slash in this area actually hamstrung the company's chances for efficient output.

Department B, on the other hand, could have been effectively streamlined with a much larger than 10 percent budget reduction. With that comparatively low cut, it continued as a prime cost leak.

In the long run, it is only the plan that is based on a realistic analysis of the production situation that will yield results.

Here is the way a more forward-

looking, more realistic management group handled its cost-cutting problem:

Top management executives came to the decision that a major effort of cost cutting was essential in order for the company to retain its position. But it was thought of as an *operating* rather than a budgetary problem.

A program was then mapped out in the broadest possible outline. It consisted of these three steps:

1. The cooperation of management of all levels was to be enlisted.

2. Top management was to supply operating management with the general methods required to tap the reservoir of front-line know-how.

3. Front-line supervisors were to be specifically equipped to enlist the cooperation of the rank-and-file employees.

Starting with these three basic steps, a sound cost-cutting campaign may be planned for any business organization, regardless of size. The problem is largely that of adaptation—of blueprinting the action so that it fits the specific people and circumstances of your organization. That is the way one company implemented the plan.

Emphasis On Need

To really get up a strong head of steam for the program, it is essential for the entire management group to understand the reasons behind it. Unless the need for the program is clearly spelled out—unless every individual in management gets a clear picture of the problem—cooperation is likely to be half-hearted, even completely absent.

Some strange yet natural attitudes have been uncovered, among even management groups, in companies where cost cutting has been undertaken—

"More economy talk. But the company's been making money hand over fist for the last ten years."

"My department is working at top efficiency. I've cut right down to the bone. Why don't they concentrate on the topheavy departments, the staff services, the inefficiently run office department?"

"Just last week I was told I'd have to hire more people to get set for the seasonal load. Now I'm told we're retrenching. Doesn't anybody know what's going on?"

Obviously, the way to put the story across is to get your people together and tell it to them. Exactly how this is done depends on (a) the size of the management group, (b) geographical distribution, and (c) the methods you have used in the past to communicate with management personnel.

In most cases, the general answer lies in staff meetings or conferences. The number of meetings and the size of the groups you choose are questions of deciding under what conditions your speakers are most effective, and what degree of formality or informality in the meetings will make your people most receptive.

Show Management Backing

Two speakers should appear before each group. The first should be of sufficient stature—in many cases the president or top executive is the wisest choice—to emphasize the importance attached by management to the proceedings. His role is largely introductory. After a brief statement of the vital nature of the meeting, he presents the executive who is qualified to sketch for the assemblage the company's competitive position. These points should then be covered:

1. The existing demand for the company's products.

2. Market status of competitive products—data on comparative prices, quality and packaging.

3. The economic pressures influencing the company's sales and prices, such as those touched upon at the beginning of this article.

4. The effect of continued high costs on the company's future.

The talk should be as concise as possible. Digressions into minor details, or the reeling off of too many figures, tend to obscure the fundamental action-aims of the proceedings. The main point that should emerge is that the company's difficulties can best be met—often can *only* be met—through reduction of costs.

Supplying the Tools

Once the need for the campaign has been established, the practical cost-cutting steps must be developed. The actual effort must take place at the supervisory or operating level.

The one preliminary idea that must be put across to your supervisors is this: Sound cost-cutting results when *wasteful operation is eliminated.* There are hundreds of sources of waste in every company. Plugging these cost leaks is the purpose of your campaign.

Begin by setting up the problem for your supervisors. Explain that there are five basic resources in your company, some or all of which are going to waste in every department:

1. *Effort*—exerted but accomplishing nothing. An example is the unnecessary moving or shifting of supplies or equipment, due to poor layout.

2. *Material* — spoiled, misused, or dumped as waste. Contamination due to careless handling or poor storage is an illustration.

3. *Talent*—stored in the minds and muscles, but left untapped. Failure to get useful ideas from subordinates is a notable example.

4. *Time*—men and machines whose idleness cuts down output. Example here is improper maintenance, causing unnecessary machine down time.

5. *Money*—misspent, saved unwisely, or lost through errors. Example: requisitioning more supplies than are needed.

Make it clear to your supervisors that by plugging leaks like these, departments can become efficient units that use every last bit of thought, work and effort.

Payoff Point

Once the general approach to cost-cutting is grasped, the question becomes one of spotlighting the specific wastes that exist on the work-scene. This should be done in meetings along divisional lines, the division head leading a conference of his supervisors group.

The executive conducting the staff meeting with the supervisors starts the ball rolling with questions of this kind:

Are there any jobs in your department that duplicate some other effort in your own or in another department? If the answer is "yes", can one of the operations be combined, or one dispensed with?

Are there any jobs in your department that could be better done (a) by someone else?, (b) somewhere else?, (c) at some other time?, (d) in another way?

Could a rearrangement of the workplace simplify a job?

Would better materials make the job easier?

Would different equipment make the job easier?

The procedure is similar for each of the other major kinds of waste. Here are key questions in each of the other areas:

Are there sources of material waste in your department that you feel could stand closer scrutiny?

If waste results from the regular work of your department, have you failed to use the standard methods of

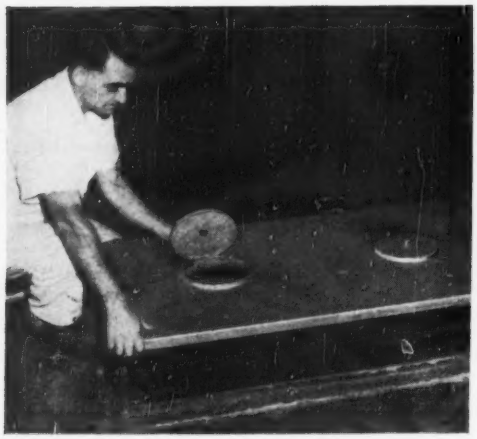
(*Turn to page* 190)

YOUR SAVING PLAN

should aim at conserving these 5 basic resources:

- **EFFORT—often exerted to no advantage**
- **MATERIAL—often spoiled, misused, or dumped as waste**
- **TALENT—often left untapped**
- **TIME—often lost in idleness of men and machines, cutting down output**
- **MONEY—often misspent, saved unwisely, or lost through errors**

Every unit comes apart in jig time . . .



JUST an easy heft, and hingeless, seamless covers over chocolate melters are off. Cover-lips keep out dirt.

SIDE BARS on caramel cooling table are quickly lifted so candy residues may be scraped away by worker.

NO MORE FIGHTING with fixed hoppers and pipes feeding Moguls. Workers show easy disassembly of new units.

QUICK-WAY

Loft Finds It Pays Handsomely In

JOHN V. ZIEMBA
Assistant Editor, "Food Industries"

"If it's the kind of unit that requires the services of mechanics and porters whenever it's cleaned—in short, a disassembly and reassembly job stretching into hours—then it's not for us."

This expresses the criterion set down for sanitary equipment by Loft Candy Corp., Long Island City, N. Y. And as a result of following this key principle, the company's confection lines now feature units that take only a jiffy to dismantle for sanitation. Today, new, effective, double-quick cleaning routines have been set up, and the operation ledger shows savings of much good money, labor, and time.

Nor is this the whole story. With President George R. Frederick ranging the target, top management broadened the attack into an over-all product-improvement program. In all, six major points have been achieved in this top-sanitation plan:

1. Equipment has been redesigned so that it is quickly dismantled and reassembled, thus speeding cleanups.

2. Surfaces of equipment in product-zones are readily accessible for inspection and cleaning.

3. Equipment is inherently more sanitary. Surfaces in contact with product-zones are polished and corrosion-resistant. Units are free from dead-end holes, rough spots, seams, crevices and sharp corners so that they can be readily brushed and washed without leaving a residue of product in inaccessible areas to decompose and turn rancid.

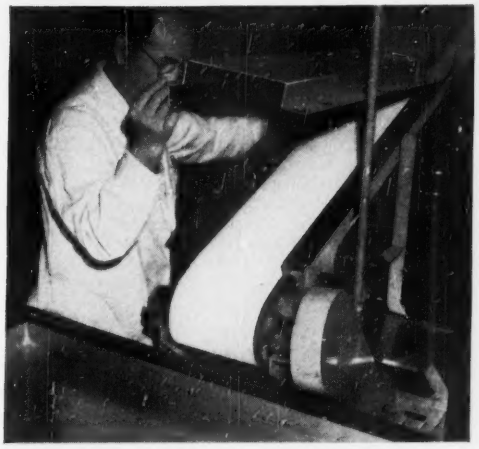
4. Equipment is suitably covered and housed to protect products. Covers are free from seams, hinges, crevices and beads in which dirt might gather. And housings enclose all drive-shafts to prevent machine grease from working into the confections.

5. Virtually all ingredients and packaging supplies are fumigated before they enter the plant. There is a triple inspection of all raw materials. And a roaming inspector constantly checks ingredients, finished candy, and equipment.

6. General cleanliness of the plant, equipment and utensils are checked through weekly sanitary inspections, thus keeping the plant free from insect and rodent infestation.

Progress in candy-plant sanitation is exemplified by the special equipment installed at Loft's. Stainless steel pipes, fittings, valves, machine

. . . and is back together in a twinkling



AFTER cleaning hard-candy cooling tunnel, top is wing-nutted back into place in only a few minutes.

IN A JIFFY, cleaned cover of tempering kettle is replaced. Plexiglas hood protects thermometer opening.

SANITATION

Time, Money, and Product Savings

LOST TIME is nipped. Girl is dipping caramels again even before porter snaps down cleaned sides of table.

parts and utensils have been used wherever possible. Machines have been built with rounded corners and without seams.

A feature of the new "quick-apart" equipment is that no special tools are needed for the disassembling and reassembly jobs, hence operations are speeded. And sanitary valves and fittings have replaced those that were difficult to take apart, inspect and clean.

Some of these pieces of special equipment will be described in the following paragraphs, and readers will find the principles of their design valuable for adoption in a variety of food plants.

Automatic Units Reduce Handling

The use of automatic equipment, such as continuous fondant-making machines, chocolate melters, tempering units, enrobers and forming machines, has enabled the company to reduce handling by the workers and thus minimize contamination.

For instance, there is no longer any hand work in the manufacture of truffle candy—a mixture of nut paste and chocolate, formed into layers. Formerly, this candy was poured into small pans in which the layers were levelled by hand. But now the candy is poured onto large slabs, where each layer is levelled with an iron bar.

Also, consider what the company did to sanitize its caramel-rolling job: In the old way, this job was done by hand. But now, a special machine does the work. Caramels are rolled between two wire belts, both traveling in the same direction but at different speeds.

Nougat making was another of the big-volume tasks that required considerable hand work. The company got around this problem by developing a continuous method of making this candy. Now (1) the ingredients are precooked in a steam-jacketed kettle, (2) pumped into another kettle where they are cooked to the desired temperature, and then (3) whipped in a high-speed 340-qt. vertical, beater-type mixer.

Parts Designed for Easy Cleaning

Agitators feature simplicity of design, yet are efficient and easily removed. And another thing: All specifications call for sanitary valves that can be readily taken off the equipment and as quickly replaced. To remove a valve, all a worker has to do is disassemble the valve collar, next the head of the valve, and then remove a nut holding the pin that fits into the valve head.

Former valves could not be easily taken apart. And even after cleaning and reassembly, pockets would still remain where creams, jellies, gums and marshmallow could accumulate, later to ferment and contaminate other batches.

To reduce possibility of contamination, the company recently revamped its system of feeding creams, gums and marshmallow from the kettles to the Mogul machines.

How Handling Was Improved

Formerly, creams, jellies, gums and marshmallow were emptied from the kettles through an ordinary valve into an 18 x 18-in. tin hopper that was cemented to the floor. This hopper was connected to a non-removable iron pipe that fed down to the hopper of the Mogul machines. Because hopper and pipe could not be dismantled, they were not easy to clean, hence they were sources of serious contamination.

Now, things are different in these departments. The old copper cooking kettles have been replaced with stainless steel ones that are easier to clean. In short, there is no more copper to promote oxidation, making fats rancid. Here, too, use of the ordinary valves has been discontinued because they have too many parts. The company feels that the less parts on equipment, the less are the chances of contamination.

Ready for the Moguls, the cream now flows through an opening in the bottom of the kettles into a removable stainless steel hopper fitted into a 4-in.-dia. pipe, likewise removable and of stainless-steel, that in turn feeds into the Moguls. This pipe nests snugly into a stationary iron pipe anchored to the floor and extending several inches above it. The iron pipe has a stainless-steel, removable adjustment-collar that holds the stainless steel pipe in place. The removable hopper, pipe and collar simplify the cleaning task and eliminate former sources of contamination.

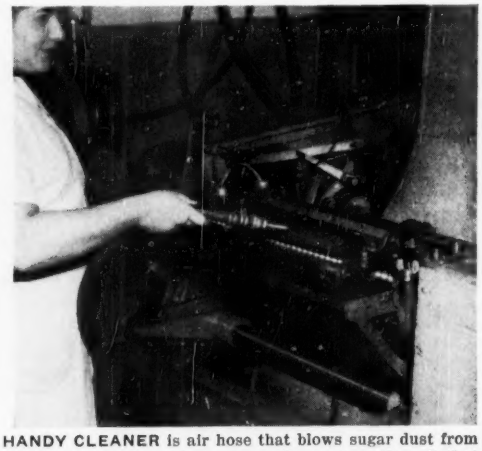
In the chocolate-breaking room, hingeless and seamless covers for the chocolate melters on the floor below are removable. Another sanitation feature is the protection provided by the outer lip of the cover. This lip prevents foreign matter from falling into the melters. Small hingeless and seamless peep-hole covers also fit into the center of the chocolate melting-tank covers.

Sanitary Machines for Chocolate

Chocolate-breaking machines are also readily dismantled and cleaned. By removing thumb screws, the hopper,

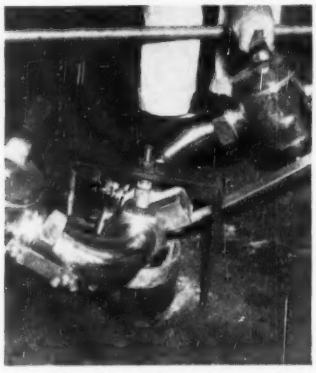
A Bevy of Improvements Promotes Cleanliness

COOKING KETTLE is made of stainless steel, has no seams or crevices, tilts for emptying and washing. Sanitary agitator cants up for cleaning.



HANDY CLEANER is air hose that blows sugar dust from hard-to-get-at areas. Here, it's used on automatic unit that forms the ever-popular sour-ball candies.

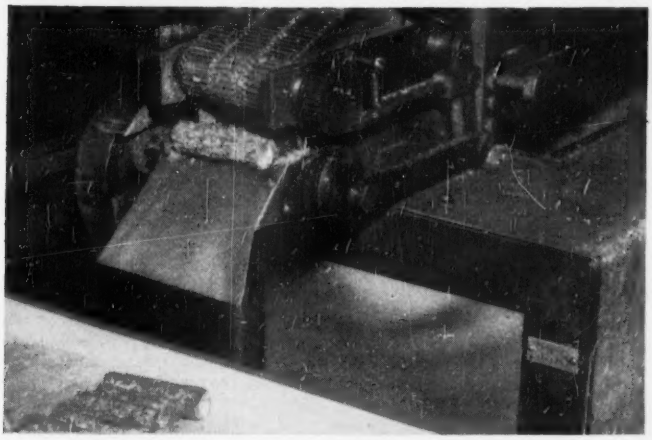
SANITARY hand-dipping table has stainless steel top, rounded corners.



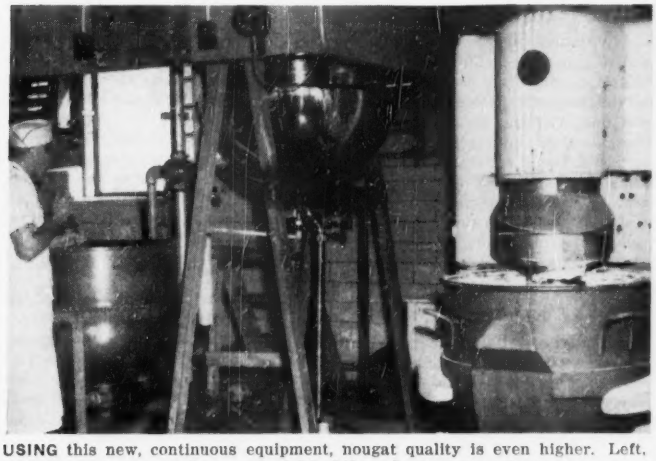
ONE of plant's jiffy-cleaned sanitary valves. Note spic-and-span fittings.

COATING PAN that empties from bottom eliminates old scoop-out job.

Automatic Units Reduce Handling, Minimize Contamination



BELTS instead of hands now shape the caramel rolls—meaning better-than-ever cleanliness in making these popular Loft confections.



USING this new, continuous equipment, nougat quality is even higher. Left, precooker; center, cooker; and right, 340-qt. beater-type mixer.

FONDANT, too, is prepared continuously—has greater uniformity.

sides of the machine, grinding teeth, and bottom chute come apart.

Automatically heated, instrument-controlled chocolate melters have been fitted with sanitary valves and stainless-steel pipes. The latter are heated to keep the chocolate in a fluid state. Electric buzz bars, which heat the pipes, can be removed by turning wing nuts. The pipes go through to the floor below, where the chocolate is drawn off into portable vats and dumped into tempering kettles.

Tempering Kettles Have Many Features

The stainless steel tempering kettles have several features promoting cleanliness. Valves, agitators, agitator shafts, and scraper blades are removable. All corners in the tank are rounded, and all parts are quickly accessible for sanitizing. Contact of lubricating grease with product is eliminated by a sealed bearing at the top of the drive spindle. And a smooth white housing securely encloses the transmission and motor.

Further sanitation was achieved through the new design of the chocolate tempering kettles. Several changes were required. Covers were made hingeless and seamless, with the corners rounded. In the center of each cover, there was a 16-in. opening for the thermometer. Now, a Plexiglas hood has been installed to prevent dust from getting into the chocolate and to permit the operator to read the thermometer, without removing the cover.

Outlets of the kettles are equipped with stainless-steel pipes and sanitary fittings. Chocolate coating is piped directly from tempering kettles to enrobers, instead of being fed to them by buckets. The coating is held to the correct temperature by means of electric buzz bars attached to the pipes with wing nuts.

Another improvement in sanitation has been the substitution of stainless-steel portable vats for the old iron ones. The new type vat, mounted upon a steel frame over rubber casters, carries 500 lb. of chocolate from melters to tempering kettles.

Accent on Removability

Changes have also been made in the solid-mold chocolate-filling machines. Here, again, stainless steel is now used,

all corners are rounded, and cracks and crevices have been banished. Dismantling of these units is simple. Just a few twists on the wing nuts and thumb screws, and the parts are readily removed so that the hopper, chain-belt conveyor, and extension table can be cleaned.

A machine that extrudes 15 coconut centers (1-in. dia.) with a single stroke of the plunger, then deposits them on a belt feeding the enrober, has been redesigned for better sanitation. Sides of the hopper can be quickly dismantled by loosening wing nuts; pistons and pump bars by turning thumb screws.

Two changes in the solid-mold chocolate-cooling tunnels ease the sanitation job. Sides of the tunnels come off merely by turning wing nuts. Removable, too, are the catch pans below the tunnels.

In the enrobing room, easy-to-keep-clean multi-tier coolers have replaced the former cooling tunnels. These new units have been installed in well-lighted, air-conditioned, insect-free rooms. One of the chief objections to the older cooling units was the possibility of rodents nesting in the beaverboard insulation.

Sanitary-Constructed Machines

The long-used nut-cluster machine has been remodeled. Corrosion-vulnerable metal has been replaced with stainless steel. Also, corners have been rounded, and the revamped unit is of seamless construction. This machine has been equipped with an individual motor to replace the belt-drive.

Stainless-steel coating pans are replacing some of the copper ones. The insides of these new pans are quickly cleaned. For one thing, all corners on the inside baffle angles are rounded. And there is another feature: The new pans have a 12 x 18-in. slot so that candy can be emptied from the bottom of the pans. No tedious scoop-out job any more.

Special sanitary features have been incorporated in the starch depositors. First, there has been a redesigning of the hopper that feeds cream, jelly, gum or marshmallow into starch molds. It is now seamless, and all corners are rounded. Second, this hopper has been joined to the frame of the depositing machine so that there are no intervening cracks or crevices for the accumulation of material. Third, each depositor has a steam hose attached for cleaning the machine at the end of the day.

Machines used to cut crunches and nougats to size can also be quickly taken apart and cleaned. The stainless steel guard is removable. Only one nut holds the 32 circular knives together. Guide bars are fastened to the conveyor by convenient wing nuts. And the conveyor is attached to the frame of the machine by easy-to-remove thumb screws.

Better design also marks the caramel cooking kettles. Made of stainless steel, each new kettle is equipped with a hydraulic lift to facilitate emptying it. And each double-effect agitator may be canted up for washing.

Cooling Tunnel Accessible

Hard-candy cooling tunnels can be readily purged of dust and broken pieces of candy. Tops of the tunnels are dismantled by removing wing nuts. Similarly, bon bon cooling tunnels can be taken down by loosening a few wing nuts.

In place of permanent, wooden side bars on fudge, caramel and toffee cooling tables, removable 1-in. bars of stainless steel are now used. The trouble with the permanent bars was that candy often accumulated beneath them, fermented, and thus contaminated subsequent batches of candies. But now, the new bars are lifted in a jiffy to keep a formerly inaccessible area clean and to eliminate contamination.

This same idea has been carried over to the inspection tables, where girls sort nuts, throwing out the discolored ones, together with any shells, paper or metal. Tops of these tables have removable, hinged wooden sides that are designed to eliminate insect infestation, formerly attributed to the collection of shells and nut fragments in crevices and cracks.

More Stainless Steel Utensils

Fondant tubs, formerly made of wood and lined with thin sheets of galvanized iron, are now being replaced with stainless steel units. These new tubs are quickly cleaned, since there are no crevices or cracks, and all corners are rounded. Furthermore, the tubs are light in weight, and it is no longer necessary to re-line them repeatedly with galvanized-iron sheets.

Stainless steel ingredient pails are being used in the cream departments in place of the old 3-gal. galvanized iron ones. These new pails are sanitary-plus—seamless and corrosion-resistant. In addition, they are longer lasting—built to stand up much better under abuse.

Discarded are all the old 100-lb.-capacity, tin-plated iron pans for collecting hard candy from cooking kettles and carrying it to the cooling slabs. Stainless steel pans have taken their place. These new pans are lighter, stronger, easier to handle, and more sanitary.

Gone, too, are the composition-topped work tables in the chocolate-molding department. In their place are readily cleaned, stainless steel tables featuring round legs and corners and removable chocolate dipping pans.

Modernized for Less Maintenance

"A sloppy plant breeds sloppy working habits," emphasizes Sam Goldstein, chief chemist. "So our company has bent over backward to keep the plant spic and span."

A short description tells how it has been done:

All departments have been modernized to simplify sanitary maintenance. Washable tile floors and walls, glass-block windows, pitched and easily drained floors, and corrosion-resistant floor joints have been put in every department. There is no chance of bits of paint breaking off and falling into cooking kettles, for the ceilings have been covered with an alkaloid, peel-resistant covering.

Multi-vane blowers have been installed in candy-cooking rooms to remove steam. Hence, there is no longer condensation on the ceiling to carry dirt into the open kettles.

With the floors and walls refinished with tile, the company has saved considerably on repairs and clean-up labor. The new floors minimize repair work; and the walls need no repaint jobs.

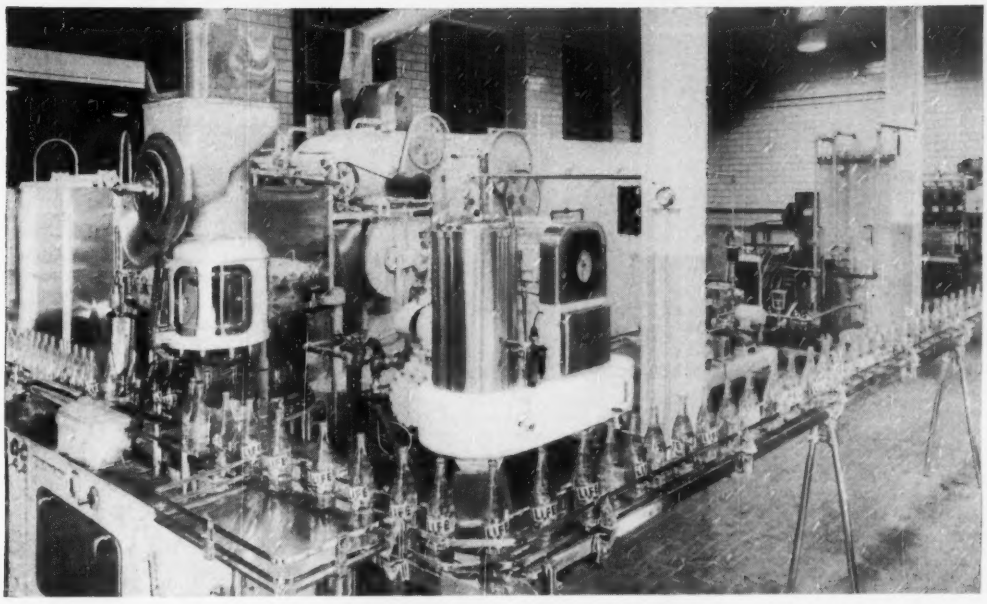
To clean the caramel department, for example, it formerly took four men about four hours to mop the concrete floors. Since this department has been modernized, one man hoses and squeegees the tile floor in one hour.

One Man Replaces Twelve

Notable savings in sanitary maintenance have been attained by using a portable steam jenny in the cherry cordial department. Before, twelve men worked an hour to clean the 60 x 60-ft. room, with its depositors and shaking belts. But using the jenny, just one man is needed to clean this area. And he does the job in the same time—one hour.

The task of keeping the glacé fruits department clean has been one of the most difficult sanitation chores. In the repeated handlings required for fruit crystallization, syrup and fruit sometimes fell to the floor, and created an unsanitary condition. Best solution to this condition has been the adoption of a rigid clean-up program. Workers have been instructed to hose down this department at frequent intervals during the day.

How Loft controls the quality of its products through special inspection and fumigation of raw materials before they enter the plant, plus weekly sanitary checkups, will be detailed in another fact-packed article to appear in a subsequent issue of FOOD INDUSTRIES.



BOTTLING LINE, at new I.O.A. Foods, Cedar Rapids, Iowa, plant, on which 12 and 26 oz. bottles of soft drinks are filled. Pre-mixing unit (right) meters syrup and water into carbonator-cooler (center) that feeds filler (left center).

12 Flavors—Yet No Syruper

Iowa bottler gets greater uniformity and faster filling by mixing syrup and water before carbonating. Pulp drinks handled without difficulty

A. V. GEMMILL
Assistant Editor "Food Industries"

It is not uncommon for a comparative newcomer in an industry to introduce unique ways of doing things—and sometimes these fresh approaches prove so effective that they stimulate a brand new, and lasting, trend.

The point is raised because those who have seen the operation of I.O.A. Foods at Cedar Rapids, Iowa, say that the company should take a bow for doing that kind of pioneering in the carbonated beverage field. Whether or not that's putting it too strongly cannot, of course, be decided so early. But we can report that they are having considerable success with the special procedure.

Briefly, this is the highlight of the new way: The company has eliminated syrupers from its bottling lines and attained greater uniformity in its beverages, and increased capacity from its fillers.

Now for the details of the operation: On the newly completed bottling lines, where twelve flavors are filled into 12 and 26 oz. bottles, pre-mix lines are used. Water and syrup are fed into a Syncrometer which automatically and accurately proportions them into a Carbo-Cooler. Here they are mixed, cooled and carbonated. The finished drink then passes to pressure fillers, where it is bottled and crowned (as illustrated in our cover picture).

Pulp Drinks Easily Handled

Mission orange and lemonade pulp drinks are filled on both lines. And no difficulty has been experienced due to carry-over of pulp into the next flavor bottled. The regular procedure, of flushing the metering, carbonating-cooling, and filling equipment with sterile water, removes all pulp particles. No trace of pulp has ever been found in the bottles filled after this washing procedure.

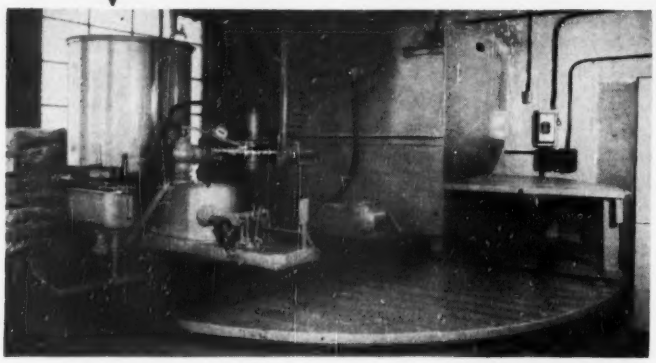
Approximately 20 min. is required to clean up the equipment between flavors—as compared with 10 min. on conventional equipment. However, this extra 10 min. is quickly made up by the higher filling speed attainable with this system. In addition, I.O.A. Foods executives report that the resulting beverages are more uniform in flavor and specific gravity than those usually bottled on lines employing conventional filling equipment.

In washing the equipment between flavors, a slight amount of water adheres to it and to the connecting piping. To compensate for the diluting effect of this residual water, the syrup meter is operated two full extra turns at the start of each run. This provides for a higher than average Brix reading in the contents of the first bottles that are filled.

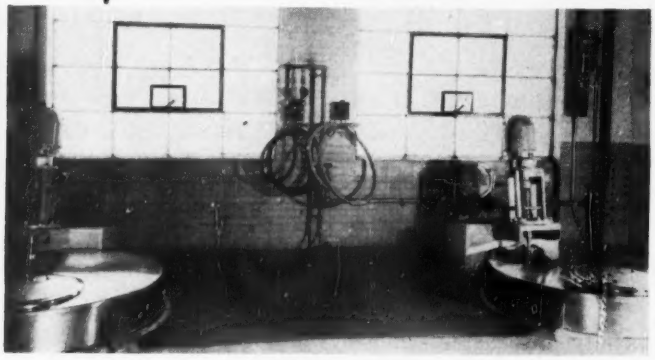
Greater Uniformity Attained

Finished drinks are checked frequently for syrup content by means of refractometer readings. When the readings made on beverages bottled in this plant were compared with those on drinks bottled on conventional lines—in which syrupers are used—in the company's two other plants, officials

Gravity ↓ Flow Simplifies Operation



5TH FLOOR water treating room has lime storage tank mounted on top of accelator unit. And subsequently the treated water goes down to—



4TH FLOOR. Here, syrups are made (in stainless steel tanks that have been set in the floor to facilitate dumping of sugar) then go down to—

3RD FLOOR, where syrups are filtered before they are stored in stainless steel tanks that feed premixing meters in bottling room on first floor. Note use of plastic tubing.

were convinced the new system produced much more uniform products.

In a five-story-and-basement building, completed last year, the company carries on its bottling operations separately from its other food manufacturing and packaging*. However, full advantage has been taken of the plant's multi-story construction in installing the equipment for handling empty beverage returns, filled beverage stock, and for the actual processing operations.

Products Move By Gravity

The water settling tank is located on the fourth floor. But its top extends through the ceiling into a 20 x 20 ft. water treating room on the fifth floor (see photo) where a lime storage tank and chemical feeders are located. Sand and disk filters are in the third floor syrup storage room, and water for bottling flows directly from them to the first floor filling lines. Incidentally, the second floor is given over to the company's offices.

Syrups are manufactured in mixing tanks sunk in the fourth floor. Finished syrups are stored on the third floor in stainless steel tanks, from which they flow by gravity to the filling lines on the first floor. The filling room is operated in full public view

* I.O.A. Foods is a manufacturing division of Witwer Grocery Co., operator of a number of wholesale grocery houses throughout the state of Iowa. It manufactures a diversity of food products which are sold under the I.O.A. brand. Among the products made are: Salad and French dressings, sandwich spread, peanut butter and roasted peanuts, pancake and buckwheat flours, flavoring extracts, mustard, apple cider and distilled vinegar. Also, coffee is blended, roasted and packaged, and honey, too, is processed and packaged.

behind plate glass windows. In addition to the area utilized by the filling equipment, there are 8,000 sq. ft. on the first floor used for storage of finished beverages, and 1,800 sq. ft. for truck loading.

Control of humidity in the bottling room is effected by a unit which continuously draws fresh air from the outside and, in winter, heats it. Excess air goes to the adjacent finished storage area. This system has eliminated condensation on the front windows.

Load, Unload Conveyor

Hinged two-way conveyor sections are employed in the truck loading area to permit both unloading and loading from the same location. When these sections are in the "up" position, cases of filled bottles roll out to truck loading stations (see photo). When in the "down", or unload, position, they discharge onto a "live" roller conveyor, which takes the cases of empties through the wall and under the first floor directly to storage areas in the basement.

Bottle washers are of the basement feed type, with no open connections between the filling room and the basement. On one of the filling lines, a 24-spout Meyer filler handles 12 oz. bottles at the rate of 80 per min., and 26 oz. bottles at 60 per min. On the other line, a 34-spout unit fills 12 oz. bottles exclusively, at the rate of 160 bpm.

As each case is filled with bottles of finished beverage, it rolls past a counter, onto a "live" roller conveyor, then to, or through, the storage area. If not removed here the case is conveyed to the loading area.

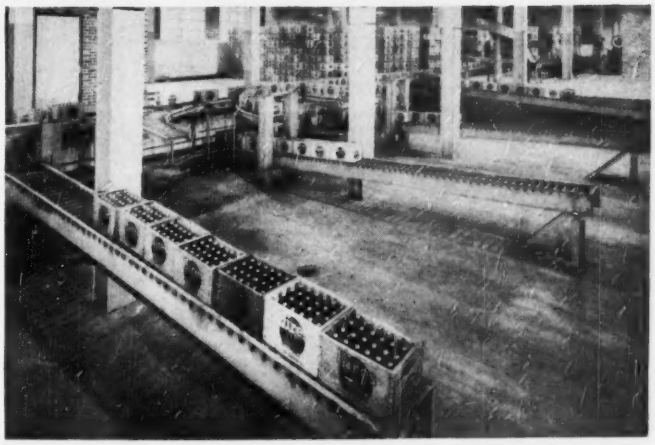
Practically the entire basement is given over to storage of returns. In this basement, directly below the first floor bottling room, are the two soaker-washer feeds. Cases of sorted bottles are conveyed directly to these feeds, and at the correct height for easy removal of bottles.

Cases Washed Regularly

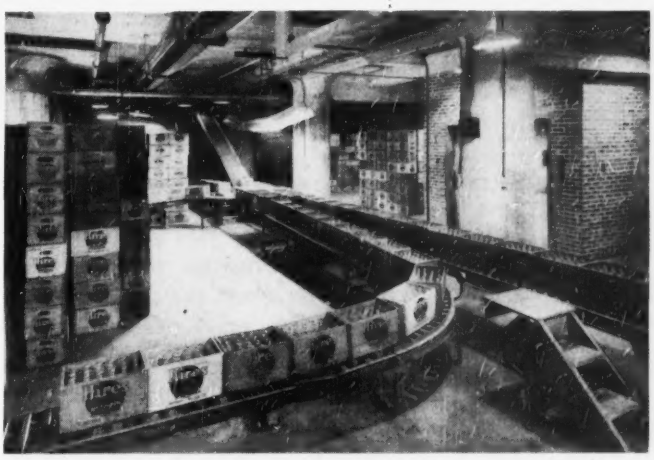
From the washer feeds, cases are conveyed on a chain-link conveyor to Mojonnier dairy-type case washers. Here, an operator lifts out the corrugated dividers, and turns the cases upside down to remove loose dirt, broken glass and other foreign matter.

The cases then continue through the washers on the power conveyor. Upon leaving the washers, the conveyors make 180 deg. turns and return the cases to the same operator, who turns them over and inserts dividers. Cases then enter a pusher rod booster which elevates them to the first floor bottling room. Here, they move on gravity roller conveyors to the casing tables of the bottling lines where they are filled and conveyed to storage or to loading.

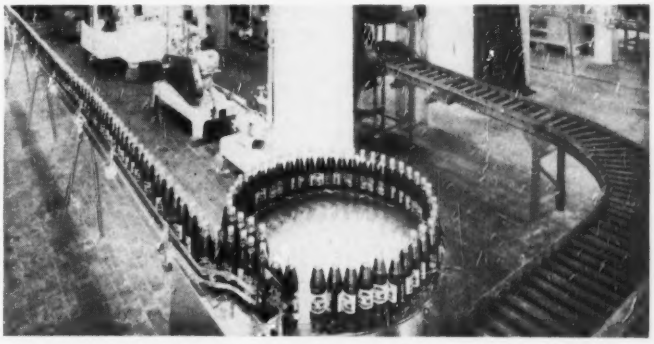
Conveyors Speed Case Movements



IN TRUCK LOADING area, conveyor in the "up" position (foreground) feeds the filled cases to loading station. In "down" position (center) cases of empties are fed to a "live" section that moves them into basement.



IN BASEMENT, 14,000 sq. ft. are used for storage of returns. Conveyors route cases of empties to sorting areas, soaker-washer feeds, or storage.



AND IN FILLING ROOM, chain conveyors move filled bottles to accumulating table, while roller conveyors (gravity and "live"), take filled cases to storage.

1 **ANDERSON**—Wonders if we are progressing fast enough to win the peace.

2 **DODD**—Sees no narrowing, as yet, in gap between well and poorly fed.

WORLD FOOD OUTLOOK

WORLD production and distribution of food as a weapon for peace was given a thorough airing at a symposium arranged by the Chemical Engineers Club, Washington, D. C., in November. With Senator Clinton P. Anderson, former Secretary of Agriculture, acting as moderator, the world food outlook, what agronomy can contribute, and the food technologist's place in world feeding were discussed by a panel. Norris E. Dodd, director general, FAO; Vincent Sauchelli, director of agricultural research, The Davison Chemical Corp., and F. K. Lawler, editor, FOOD INDUSTRIES were the panel members.

1 Food Might Still Write the Peace

In opening the discussion, Senator Anderson recalled the wartime slogan, "Food will win the war and write the peace."

We made good on the first part, he commented, but four years from the close of the war, we are not so sure about the second. Our granaries are filled to the brim and we are looking for places to store several hundred million bushels of wheat and greater quantities of corn. If our possession of the atomic bomb is not going to frighten other nations out of war, then maybe we need a new weapon. And it is just possible that greater world production and better world distribution of food could be that weapon.

2 What the World Is Doing About It

Agricultural dislocations were far more serious after World War II than after World War I, Mr. Dodd said in opening his part of the discussion. There was a serious setback not only throughout Europe and in the European regions of the USSR, but also over large areas of the Far East. As a result, countries such as Canada, Cuba and the United States, among others, greatly expanded agricultural output to meet the wartime demand.

In countries where the food and nutrition situation was generally satisfactory before the war, it is now even more satisfactory. But in countries where people historically have had too little food, the situation has grown worse. And the latter countries, many of them Asiatic, represent more than half the world's population. To put it simply, the gap between the well-fed and the poorly fed has widened.

International Calorie Count Low

Nutritionists estimate that the average person should have 2,550 calories a day to remain reasonably healthy. Dodd declared that a lot of people are not getting this minimum. In fact the world average is perhaps 2,220, compared to about 2,400 before the war. People in countries like Argentina, Australia, Canada, Denmark, Eire, New Zealand, Norway, Sweden, the United Kingdom and the United States average over 3,000 calories a day. At the other end of the scale we find countries of the Far East, except Thailand, and all of the countries of Africa, except the Union of South Africa, with a daily intake averaging less than 2,000 calories. In between we find countries of the Near East at about 2,500, while the remaining countries of Europe average daily caloric intakes ranging from 2,300 to 2,900.

India, Mexico and Poland are among the few countries that have already taken steps to push agriculture ahead of population growth. For the world as a whole, however, little speeding up of agriculture seems likely until new, more determined, organized efforts are made.

For the Far East, Mr. Dodd thought it was difficult to generalize. China is, to a great extent, an unknown element. Japan may be near the limit of her food producing potential. India is straining for self-sufficiency by 1951. Other countries in Southeast Asia have programs of various sorts, but massive technical and social problems have bedeviled efforts to expand production.

3 SAUCHELLI—Refutes Malthus. Holds world's food resources ample if harnessed.

4 LAWLER—Says processing know-how is available, if properly tapped.

—FOUR POINTS OF VIEW

The USSR, Dodd said, has plans for further rapid expansion of agriculture. Currently farmers are being urged to emphasize livestock production over plant crops. This may indicate that Russia has enough bread and potatoes and is aiming at a more diversified diet. The USSR has production targets that would permit the export of food and forest products on a substantial scale, if she so desired.

Eastern European countries are aiming at a switch from grain exports to exports of livestock products. The countries of western and central Europe are trying to produce more food in order to limit their imports to what they can pay for. Results of these efforts will not be fully evident until after 1950-51. Present plans should bring Europe's output of grains to just about prewar level by 1950-51, sugar will be about 12 percent above prewar, while milk and meat should reach to about 90 percent of prewar totals.

Argentina hopes to resume her former status as a major wheat producer and exporter, Brazil is proposing heavy expenditures to bring new areas into cultivation, as well as the extensive use of improved seeds, fertilizers, farm machinery and irrigation. Mexico's six-year plan aims at reducing cereal imports by extensive irrigation of new land and wider use of fertilizers. Venezuela has a minimum plan to reduce imports by increasing cultivation of corn, rice, potatoes, pulses and oil seeds. In the West Indies, the British are developing a citrus industry to insure a more adequate supply within the sterling area. In general, however, none of the Latin American countries is yet taking action that is likely to increase production faster than the population is growing.

Trends in Australia and New Zealand suggest expansion of production, but at a comparatively slow rate. Both countries have an assured market in the United Kingdom for almost all of their food exports.

Dark Continent Will Export

In colonial Africa, large developments have been started or are planned. Apart from oilseeds, several colonial territories plan an expansion of cotton, coffee, and tobacco production for export. The Union of South Africa plans to develop her sugar production until she again has an export surplus. No further expansion of fruit for export is contemplated, but more oilseeds will be grown for domestic use. North Africa is planning higher production to meet the needs of the rapidly increasing population, and is expanding citrus for export. The Near East has ambitious irrigation proposals that will take some years to achieve.

For the world as a whole, Dodd predicted that 1950-51 will see Europe and North America making adjustments in agricultural production as their respective economic situations require, the USSR forging ahead rapidly, but few other areas embarking on any radical programs. If appreciable change in the world's malnutrition is to be effected, steps of a far more practical and decisive character are needed.

In the first place, if living standards are to be raised, food supplies must increase more rapidly than population. Since population growth ranges from 1 percent to 2½ percent per year, food supplies must be increased by at least 2 to 3½ percent each year. FAO has no evidence that this order of expansion is being planned in underdeveloped areas, Dodd said. This is not surprising when one remembers their pitifully inadequate technical knowledge and equipment.

3 How an Abundance of Food Could Be Produced

Blasting the world starvation theories of Malthus, Vogt, Orr and Bennett, Vincent Sauchelli saw three major avenues of approach to greater food production. (1) We can intensify production on present land. (2) We can extend the areas of food production into virgin territories, such as

the forest soils of the north temperate zones, and the soils of the semi-arid and wet regions of the tropic and subtropic zones. (3) We shall have to teach peoples in all areas how to reduce losses in top soil and how to preserve foods by all the arts developed in recent years.

America Has Shown Way

Mr. Sauchelli was very confident that other peoples could use the skills, organization and technology that enabled American farmers to achieve their remarkable production in recent years, to produce food for at least double the present world population.

He showed that American production was still on the uptrend by comparing current production with that of the 1920's, listing these factors as outstanding:

1. Expanded use of power equipment, which reduced man-hours of labor per acre. In 1920 the country had 246,000 tractors; in 1946, 2,500,000.

2. Horse and mule population on American farms has been reduced from 25,500,000 in 1920 to 9,100,000 in 1946.

3. Crop production per acre has steadily increased. In 1932 we used 110,000,000 acres to produce 2,700,000,000 bu. of corn. In 1948 about 85,000,000 acres produced the record crop of 3,650,000,000 bu.

4. Power machinery on farms released about 55,000,000 acres—almost 15 percent of the total crop land—which was formerly devoted to feed and hay for the horses and mules.

5. These crop production records were achieved and are being sustained by the liberal use of commercial fertilizers, lime and better soil management practices. In 1920, total U. S. consumption of fertilizers was 7,200,000 tons; in 1948, 17,500,000 tons.

6. The plant breeder has developed methods for selecting and interbreeding desirable genes to produce new varieties adapted to local soil-climate complexes.

7. American farmers spend about $200,000,000 annually on improved methods of disease and pest control.

8. Industrial uses for agricultural products have increased, as is illustrated by the 140,000,000 bu. of corn and huge quantities of soybeans now utilized annually in industry.

All this ties in with the world food problem, in Mr. Sauchelli's estimate. Of the total world land area—about 37,700,000,000 acres—11,000,000,000 are climatically suited to cultivation. Actually only about 4,000,000,000 acres are cultivated. On the basis of today's world population—about 2,300,000,000 people—the land climatically suited for agriculture amounts to about 5 acres per person. The amount of land actually being cultivated averages about 1.5 acres per person.

The soil groups of the tropics, subtropics and temperate zones comprise 52 percent of the total land area of the world. Dr. Charles E. Kellogg, chief, Soil Survey Div., USDA, estimates that 1,000,000,000 acres in Africa, South America and some large islands could be developed for food production. Other promising areas are in the vast forest soils of the north temperate zone in Europe and North America, which comprise about 300,000,000 acres. At present less than 1 percent of these two great land areas is under cultivation.

And Work It Better

As to modern methods, Sauchelli cited experimental farms in India and Africa that are getting at least twice the yield of neighboring peasant holdings. Asia, he said, was a wonderful field for fertilizer use. More nitrogen per unit area of rice land would yield more food than any other single factor, in the shortest possible time. And there is an abundant supply of the three major soil nutrients, nitrogen, phosphoric acid and potash.

The immediate problem is to increase the productivity of the land already under cultivation. Two-thirds of the world's people are farmers. Too large a percentage, however, is cultivating poor soils, growing poor strains of crops and livestock, and using obsolete hand tools and methods.

The FAO, Sauchelli said, has estimated that in order to reach diet goals by 1960, the important food classes would have to be increased above prewar levels by the following percentages: Sugar, 12; cereals, 21; roots and tubers, 27; fats and oils, 34; meats, 46; pulses and nuts, 80; milk, 100, and fruits and vegetables, 163.

By farming present crop lands much more intensively, Sauchelli thought most of these goals could be met. The exceptions—meat, milk, and fruits and vegetables—he termed luxury crops.

To solve the protein shortage in this 1960 diet, Sauchelli cited the probable developments with vitamin B_{12} and the promise of the biochemists' work with yeasts to produce proteins with a nutritive value as high as that of beef.

4 Food Must Be Processed as Well as Grown

F. K. Lawler pointed out that steps taken to increase agricultural production in any of the underdeveloped areas should be accompanied by provision of know-how and facilities for food processing and preserving. Otherwise, how can the foods be distributed to population centers and stored to make them available out of season? We have, in this country, all the basic information that is needed to handle the usual problems of processing, packaging, storing and distributing food products. And we have the research facilities to solve most of the special problems that might arise. Also, Lawler was sure that the majority of food technologists would be personally willing to contribute their knowledge.

He thought, however, that it would be unrealistic not to add that many food processors would hesitate to tell another nation how to process food if that product were to be shipped to this country to compete in the American market. But he had no doubt that the necessary knowledge would be made available where it was designed to help the underdeveloped countries to better feed themselves.

As in other American industries, Lawler said, there are companies in the food field that would invest in plants abroad—and supply all the skills required to operate them—if they could expect a fair return on their investment.

To obtain technological help for the underdeveloped areas, he thought two things should be done. First, there should be established an organization through which technical problems can be channeled to food processors, container and equipment companies, and research organizations. A pattern for this, he noted, has been established in the Food and Container Associates of the Armed Forces. Why not have a Food and Container Associates of the FAO?

Second, Lawler continued, make known to the American food processing industry the needs and opportunities abroad for American financed and operated food plants, and invite our firms to undertake profit-making ventures in underdeveloped areas.

The functions of the food technologist also were explained by Lawler, who expressed the conviction that even in this country more engineering-minded technical personnel are needed in the food industry. Additional men of this type would speed the development of advanced processes of the highly efficient continuous type, which reduce costs and at the same time make quality control easier.

Senator Anderson Sums It Up

In his summary, Senator Anderson warned that if food is to write the peace in the next generation, the gap between the well fed and poorly fed must not be permitted to widen. He wondered, too, if we are making sufficient progress in our plans to implement President Truman's "Point 4" program. "If living standards are to be raised," he said, "food supplies, as Mr. Dodd has pointed out, must increase more rapidly than population."

How they rate . . .

COMPARISON of Frozen Packs With Canned Packs by Type of Distribution on Selected Fruit and Vegetable Products—1948 (Million Pounds).

Source: Basic data from the National Canners Assn. and National Assn. of Frozen Food Packers.

Product	Consumer Sizes[1]			Institutional and Industrial[2]		
	Pounds Canned	Pounds Frozen	Percent frozen is of canned	Pounds Canned	Pounds Frozen	Percent frozen is of canned
Red cherries, tart	75.8	.8	1.1	45.8	87.0	190.0
Peaches	741.2	5.0	0.7	7.9	8.6	108.9
Beans, G. & W.	325.8	30.1	9.2	107.0	19.5	18.2
Lima beans	67.6	46.1	68.2	5.7	29.3	514.0
Corn[3]	843.2	7.9	0.9	72.5	13.0	17.9
Peas	595.1	71.7	12.1	97.8	47.2	48.3

[1]One pound and less for frozen; all except No. 10's for canned.
[2]All sizes except one pound or less for frozen; No. 10's only for canned.
[3]Cut corn only.

. . . and per capita score

FROZEN FRUITS & VEGETABLES Per Capita Consumption (In Pounds)

Fruits*	1939	1947	1948	Vegetables†	1939	1947	1948
Blackberries	.03	.11	.13	Asparagus	.03	.12	.15
Raspberries	.08	.22	.18	Snap beans	.04	.26	.30
Strawberries	.39	.74	.79	Lima beans	.11	.37	.40
Other Berries	.14	.23	.21	Broccoli	.02	.12	.17
Apples	.01	.34	.31	Brussel sprouts	(1)	.03	.08
Apricots	...	.14	.09	Carrots	(1)	.05	.05
Cherries	.29	.57	.61	Cauliflower	(1)	.04	.09
Peaches	.03	.32	.26	Corn, cut and on cob	.05	.27	.27
Miscellaneous	.15	.51	.34	Peas, green	.22	.81	.96
				Peas and carrots	0.01	.04	.05
Total	1.12	3.18	2.92	Pumpkin and squash	(1)	.06	.06
				Rhubarb	(2)	.06	.01
				Spinach	.01	.22	.31
				Succotash	(2)	.02	.04
				Other	0.01	.09	.04
				Total	.50	2.56	2.98

*Source:] "Consumption of Food in the United States, 1909-48," Bureau of Agricultural Economics, U. S. Dept. of Agriculture.
†Source: Food Division, Office of Domestic Commerce, U. S. Dept. of Commerce.
(1) Less than .005 pounds. (2) Included with "other".

Frozen Foods Sprout New Growth

Rebound from postwar shakedown, plus rapidly multiplying wholesale and retail distribution outlets, assures steady expansion in the years ahead

THE FASTEST GROWING segment of the food industry—frozen foods—seems sure to lead the industry in rate of expansion for the next few years.

The growth of frozen food production stems directly from the consumer's demand for a higher-quality diet—more fruits, vegetables, and dairy products, less cereals and potatoes.

Processed foods in general have benefited from this trend. On the other hand, frozen fruits, vegetables, and fish are more competition for fresh products than they are for canned fruits and vegetables. Canned products show a continued expansion in per capita consumption, too, although the rate of growth is slower than that of frozen foods.

The industry has had its ups and downs in the two decades since the first frozen products got a commercial toe-hold. The most recent shake-down was only two years ago, when total production of frozen fruits and vegetables dropped almost 20 percent from 1946 output—from 973,000,000 lb. to 793,000,000 lb.

In 1948, however, the production bounced back to 844,000,000 lb.—and 1949 estimates point to a 10 percent increase in frozen fruits and vegetables.

These figures, however, do not include frozen citrus concentrates, the hottest item of them all. Output of frozen concentrated orange juice ran about 11,000,000 gal. (whole juice equivalent) in the 1948-49 season, several times the production during the previous year. For 1949-50, it is predicted that production of the concentrate will at least double and perhaps triple 1948-49.

Outlets Growing

Expansion of frozen food production still can be attributed in part to one basic factor that does not work for fresh or canned products: An expansion of the number of retail outlets.

Even as late as this fall, important food chains in major cities in the east were installing their first frozen food display cases. A year ago in the Washington, D. C., area, for instance, Safeway stores had only 5 of its supermarkets handling frozen foods. Now the company advertises that 86 of its outlets have frozen food cases.

No one really knows now how close frozen food distribution is to its sat-

(*Turn to page* 186)

SAMPLE BERRIES are carefully tested for leakage loss in this room, where constant temperature of 68 deg. F. is maintained. Senior Author Kethley is seen weighing fruit that has just been thawed under mineral spirits.

Tests Show Optimum Time For Strawberry Freezing

Quality is highest, leakage lowest, when fruit is cooled in 15 min. or less. And factor isn't altered by subsequent storage

T. W. KETHLEY, W. B. COWN, and F. BELLINGER
Engineering Experiment Station, Georgia Institute of Technology, Atlanta

The relationship between leakage from strawberries and the time required for their freezing has now been determined.

Considering that increasing amounts of leakage give an index of decreasing quality of the frozen berries, this relationship shows that berries which are cooled to 0 deg. F. in 15 min. or less will be of essentially the same quality, but that berries frozen less rapidly will show a slow decrease in quality as the time of freezing increases. This relationship is not altered during storage of the frozen berries.

Subjective vs. Objective

There has long been almost unanimous agreement among workers in the field of frozen foods that the more rapidly foods are frozen, the higher will be the quality of the final product. However, because the methods which have been employed to evaluate quality have been subject to uncontrolled variations, there has been little conclusive evidence that proves this contention.

Most evaluations have been accomplished by subjective methods, dependent on personal judgment, rather than by the use of purely objective technics. The determination of leakage, especially from frozen fruits and berries, is one of the few objective methods that have been employed to characterize the amount of damage incurred by food during the freezing process.

As part of a long range program of research on the freezing preservation of foods[1], a thorough study of the determination of leakage from fruits and berries was recently made at the Engineering Experiment Station, Georgia Institute of Technology, Atlanta. And, as a result, a new and more reliable method has been proposed for its determination[2].

Using this new method, the relationship between time required for freezing and the amount of leakage, has been determined for strawberries. In the experiments conducted, strawberries were frozen in times varying from approximately one minute to several hours. To introduce uniformity, all products were cooled to exactly 0 deg. F. and stored at that temperature. In order to

accomplish this, the use of two different media, air and alcohol, was necessary in these experiments—since it was impossible to vary conditions of a single medium sufficiently to cover the desired time range and still bring all products down to 0 deg. F. The use of two different media introduced no difficulties, however, since the results of preliminary experiments showed that the medium had no effect on the amount of leakage when the frozen fruit was defrosted.

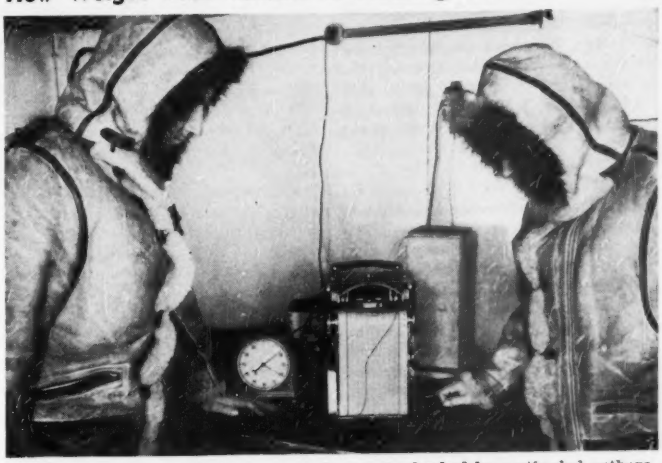
Strawberries used in these experiments were obtained from Plant City, Fla., with the assistance of J. D. Armor, Assistant County Agent. And they were frozen within 10 hr. after picking. Although these strawberries were of fair quality, they were extremely irregular in size and shape. Thus, the samples tested were considered to be representative of the average types of strawberries.

Test Details

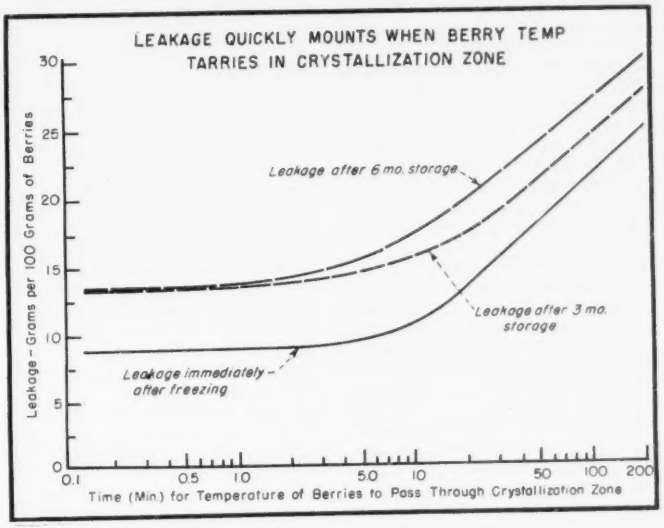
The leakage experiments were performed by placing 5.0 ± 0.5g. of whole berries in a container made of 1-in.-mesh wire screen. These containers were so constructed that the berries were held in a single layer, in order that the freezing medium might have free access to all berries. To each container was added an extra berry having a shape and size similar to the berries in the sample proper. A thermocouple of No. 30 copper-constantan wire was then located at the intersection of the longest horizontal and vertical axes of this berry, and the temperature at this point was recorded by means of a special high-speed temperature recorder[3].

After the temperature at the center of this strawberry remained constant at room temperature (70 deg. F.) for 10 min., the wire basket containing the berries was placed in the freezing medium (maintained at the predetermined temperature for freezing) and held there until the temperature at the

How Weight Loss Relates to Freezing Time



COOLING CURVE, scribed in zero workroom, is checked by arctic-clad authors, Cown (left) and Kethley. Rate of freezing of fruit is gaged from curve.



TABLE—Leakage Data on Strawberries, Following Freezing at Various Speeds

Method of Freezing	Time in Min. Required for Temp. of Berry to Drop from 67 to 0 deg. F.	Time in Min. Required for Temp. of Berry to Pass Through Zone of Crystallization	Leakage*—Grams Lost Per 100G. of Sample		
			Immediately After Freezing	After 3 Months	After 6 Months
Alcohol, — 97 deg. F., high velocity	1.0	0.5	8.0	14.1	
Alcohol, — 20 deg. F., high velocity	5.0	1.5	9.0		12.6
Air, — 97 deg. F., 2,000 fpm	5.0	1.6	10.0		14.4
Alcohol, — 20 deg. F., low velocity	8.0	3.0	10.0		15.0
Alcohol, — 5 deg. F., high velocity	11.0	3.0	8.0		
Alcohol, — 5 deg. F., low velocity	15.0	6.0	9.0	14.8	
Air, — 97 deg. F., 200 fpm	18.0	7.0	8.0		18.2
Air, — 50 deg. F., 200 fpm	20.0	8.0	9.0		
Air, — 30 deg. F., 200 fpm	50.0	20.0	16.0		
Air, 0 deg. F., 200 fpm	90.0	45.0	14.0	17.7	17.8
Air, 0 deg. F., still	170.0	100.0	22.0		
Air, 0 deg. F., still, berries in package	900.0	260.0	25.0±5**	30.9	33.0

* Leakage determined by weight-loss when berries were left for 4 hrs. in mineral spirits at 68 deg. F. Unless otherwise indicated, values given are averages for triplicate determinations.

** Average of 24 determinations. Standard deviation shown for this average is applicable to other averages in this table because all samples were taken from same lot of berries and were examined under identical conditions.

center of the berry containing the thermocouple reached 0 deg. F.*. The berries were then removed, immediately sealed in a cellophane bag, and stored at 0 deg. Whenever alcohol was employed as the freezing medium, the samples were centrifuged for 1 min. at 100 rpm. in a 12-in.-dia. perforated basket at 18 deg. F. before being packaged.

Half-Dozen Tests

At least six freezing experiments were conducted under each set of freezing conditions. For purposes of computation, the length of time required for freezing was taken as the average of the various runs. After completion of the freezing experiments, a minimum of three individual samples from each set of freezing conditions was used for the determination of leakage.

Leakage was determined by the method previously reported[3]. The samples were removed from 0 deg. F. storage to a room at 68 deg. F. and covered with mineral spirits for 1 hr. longer than the time required for the temperature of the samples to reach 68 deg. F. (for strawberries, this total time was 4 hr.). The mineral spirits were then removed and the samples were weighed. Leakage was reported as weight lost per 100g. of sample. Data for the leakage determinations made immediately after freezing and following three and six month storage periods at 0 deg. ± 0.5 F. are shown in an accompanying table.

Samples Sealed In Bags

In order to employ one set of freezing conditions in which several hours would be required for the freezing of the berries, 50.0 ± 0.5g. samples (at room temperature) were weighed into cellophane bags and sealed. These bags were then packed in waxed locker cartons and placed in the Engineering Experiment Station's 0 deg. F. room away from air currents caused by the blower in that room.

These were the only samples in this series of experiments which were frozen in containers other than the wire screen nets previously described. Because of the ease with which these samples were frozen, a large number were frozen under these conditions so that an accurate value for the variation in the leakage determination, as applied to these particular experiments, could be made.

As can be seen from the table the percent variation was ±20—attributable largely to the variation in size and shape of the individual strawberries employed.

To show best the relation between the time required for freezing and the leakage values obtained from strawberries, the data shown in the table were plotted in various ways. A plot on semi-log paper gave the most useful presentation of the data. And use of values for the time necessary for berries to pass through the zone of crystallization yielded more regular curves than did use of values for time required for the berries to reach 0 deg. F.

The zone of crystallization, incidentally, is that temperature range in which the majority of the water contained within the food is converted into ice. Many workers feel that this is the temperature range in which is incurred the bulk of the damage suffered by a food during freezing.

Curves Tell the Story

Shown in an accompanying figure are the curves obtained by plotting the length of time required for berries to pass through the zone of crystallization versus the leakage values obtained on those berries. Considering leakage as an index of quality, examination of this figure indicates that there is little or no difference in the quality of the frozen berry when 0.5 to 10 min. are required for the temperature of the berry to pass through the zone of crystallization.

For example, maximum quality in the frozen berries is obtained when they are frozen either in air at about —30 deg. F. with a linear velocity of around 3,000 fpm., or by immersion at —5 deg. F. with agitation. In either instance, 10 to 15 min. are necessary to bring the temperature at the center of the berries to 0 deg. F. In the case of air-freezing, the berries pass through the zone of crystallization in 7 to 9 min.; in immersion freezing, they pass through in 3 to 6 min.

When the strawberries were frozen under conditions requiring more than 10 min. to bring the temperature of the berries through the zone, the curves (see figure) have a fairly constant slope. However, these curves are exponential, so that there is only a slight increase in the amount of leakage obtained for a very large increase in time. This is probably attributable to the fact that there is a limit to the amount of fluid which a berry is capable of leaking (and that this limit is approached asymptotically).

Leakage Remained Same

Examination of the curves for the leakage values obtained from strawberries which have been stored for periods of three and six months shows that the samples which initially leaked the least gave the greatest percent increase in leakage resulting from three months of storage. The leakage for these samples remained essentially the same for the next three months of the experiments.

On the other hand, it can be seen that the samples in which the time of passage through the zone of crystallization was more than 10 min. showed a linear increase of leakage with an increase in storage time. It thus appears that there is a potential damage limit as reflected by the leakage values and that, as this is approached, the tendency for the damage to be increased by further storage time is diminished. This relationship is similar to that noted above between the time required for freezing and the amount of leakage obtained.

Optimum Conditions

The shape of the curves shows plainly that no simple generalization—such as "the more rapidly strawberries are frozen, the higher the quality—can accurately describe the best conditions for the freezing of strawberries. Ideally, the optimum conditions for the freezing of loose** strawberries would appear to be those previously mentioned; i.e., 10 to 15 min. in air at a temperature of —30 deg. F. and a linear velocity of 2,000 fpm., or the same length of time in an immersion freezer maintained, with agitation, at —5 deg. F.

However, the hourly costs involved in operating a particular freezer vary greatly over the range of conditions which may be employed, so that the optimum conditions for freezing which are concomitant with good economic practice must be determined by finding the point at which the curve for operating costs intersects the curve for maximum quality.

References

1. Bellinger, F., and Kethley, T. W., "Frozen Food Research Program Is Launched at Georgia Tech," FOOD INDUSTRIES, 20, 6, 98-100, 1948.
2. Kethley, T. W., Cown, W. B., and Bellinger, F., "Develop New Test for Gaging Leakage From Fruits and Berries," FOOD INDUSTRIES, 21, 2, 102-105, 1949.
3. Kethley, T. W., and Cown, W. B., "A Versatile High-Speed Temperature Recorder," *The Research Engineer*, 5, 5-6, 1943.

The above report discloses further findings made in a long-range program of research on the fundamentals of food preservation by freezing. The project is jointly sponsored by the Georgia Tech Engineering Experiment Station and the Tennessee Valley Authority.

* Complete time-temperature data were recorded in all cases.

** When berries are frozen in containers, time required for cooling can be estimated by treating the filled container as if it were a berry of the dimensions of the container. If container walls are of metal, their presence can be neglected; if of insulating material, they must be considered in the calculations. These problems can be solved by the equations for heat transfer in the unsteady state. A study of the application of these equations to the freezing of foods is now being completed.

COMBINING ice cream and frozen food deliveries in trucks of this type, Southern Dairies maintains a well-balanced distribution load throughout the year.

WHEN high volume of orders necessitates it, the company makes exclusive frozen food deliveries, using special trucks such as the one pictured here.

Frozen Foods Sped to South From Jersey Warehouse

Southern Dairies uses ice cream trucks to deliver Seabrook products through southeastern states

ONE centralized cold storage warehouse, several common-carrier truck reefer transport lines, and a fleet of 194 company-owned motor trucks are the component parts of the wholly-motorized frozen foods distribution system of Southern Dairies, Inc.

The company markets frozen fruit and vegetable products of Seabrook Farms, along with Seabrook-Armour poultry and other items, through 4,700 retail outlets in the southeastern states.

Thus, two great motor-minded organizations—Seabrook Farms, noted for its motorized farming operations at Bridgeton, N. J., and the Southern Dairies, with almost 50 milk and ice cream plants and a large fleet of trucks in Washington, D. C., and the eight southeastern states—have joined to provide a quick, reliable and economical distribution system. This united effort is seen increasing the sales of the frozen food items handled in the area and pointing the way to the establishment of similar systems in other parts of the country.

Southern Dairies has had a long experience in the distribution of frosted food products. It had already chalked up 13 years handling another frozen line when, last July 1, it switched to distribution of the Seabrook Farms' quick-frozen items.

Additional products currently distributed include Gorton's frozen fish fillets, Welch's grape juice concentrate, Ballard frozen rolls and Armour frozen poultry.

Seabrook Farms grows and packs practically its entire line at the Bridgeton farm. All the items are accumulated there in its Cumberland cold storage warehouse, said to be the largest frosted foods warehouse in the United States.

The other Southern Dairies items, including poultry, fish, juice, and other lines, are shipped in carload lots to Bridgeton and stored in the Cumberland warehouse. In this way, one centralized warehouse supplies the entire distribution area.

Starting Point

In operation, weekly orders are sent from each of the Southern Dairies plants to Bridgeton to be filled direct from this centralized warehouse.

The outbound warehouse orders then go to the respective Southern Dairies plants, moving exclusively by motor equipment.

On this warehouse-to-plant leg of the distribution system, part of the merchandise is carried by Seabrook Farms' own refrigerated tractor-trailer equipment. The remainder moves by common-carrier truck lines. However, the bodies of all these trucks or trailers are insulated and refrigerated to maintain the same maximum interior body temperature of 0 deg. F.

The Southern Dairies' plants served direct from Bridgeton are located in cities throughout Maryland, Virginia, North Carolina, South Carolina, Tennessee, Alabama, Georgia and Florida.

Arriving at the Southern Dairies' destination city, these orders are normally stored in the company's ice cream plant, or in a local cold storage warehouse if extra facilities are needed. If its frosted food sales are large enough, the company then makes its area-deliveries in special trucks carrying only the frosted foods.

No frosted food orders are delivered on the peddle system in which the truck is sent out with a load to make individual deliveries as the customer may

(*Turn to page* 188)

Why Not "Go On Your Own," Mr. T.?

An old friend of FI readers returns to discuss another delicate and more or less personal subject with his usual punch-in-the-nose subtlety

POOR RICHARD

There has been much discussion —both learned and of the back-room variety—about the proper training of those entering the field of food technology. But this commendable cerebral effort usually has been based upon the tacit assumption that the technologist's association with the food industries would be as an employee.

Richer Returns

Probably this assumption is justified in most cases. Nevertheless, this writer takes a very dim view of any training that so completely stresses the advantages and the virtues of becoming an employee for the rest of one's life. Why not point out—as early as possible and as often as possible in the education of the young food technologist—that he also has a chance to become an employer? Why not stress the fact that as an employer his training in food technology can pay off in dividends much richer than any he is likely to get as an employee?

Most men, for one reason or another, never become employers. However, all of them would be better off for having had pointed out to them, early in their training and careers, that skill in food technology can be capitalized upon in another way then selling it to a corporation.

There is no intention to imply that the ambition to one day be a department head in Mammoth Mills, Inc., is not a most worthy one. Let that be understood. Even so, there are other goals and other uses to which technical training can be put, and it is these that merit consideration here.

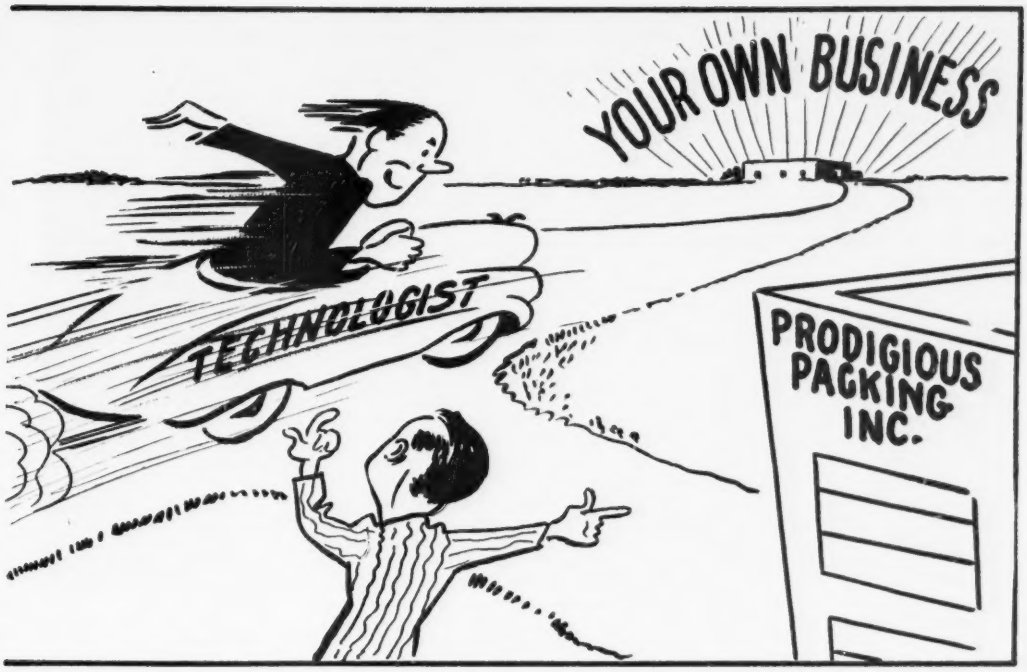
The purpose of this article is simply to nail up a few signposts—to point up the sins of omission of too many of our professors in institutions of higher learning. It may thus drop the idea, into the minds of younger technologists particularly, that getting out of the employee class is an end worth striving for—and one, moreover, within the reach of many technical men. Surprisingly, the payoff in the standard yardstick of the business world, as well as in less tangible satisfactions, often surpasses anything to be found at Mammoth Mills, Inc.

In normal times, about 400,000 new businesses are started each year. Only half of these will be left two years later. Five years after starting, about 130,000 will still be in business, the rest having fallen by the wayside. Consequently, it may be said that the young business man starting out has one chance in three of surviving five years.

Better Than It Looks

Those odds are not so bad as they look at first blush, however. Ever figure the odds against a given individual's working his way up near the top of some big corporation?

Of course, it takes courage for the gamble, even at one in three. Which



is probably the reason about 75 percent of the people of these United States go on working for someone else.

Let's take a quick look at the relative advantages and disadvantages that confront the man in business for himself.

Largely a Matter of Personality

The disadvantages boil down, in the final analysis, to his own particular type of personality. He may find, for example, that he does not like the responsibility of having the entire burden on his own shoulders. He may find, sooner or later, that he is one of those people who feel more secure when working in another's employ. He may find that he just does not have the knack for successful business management that being on your own requires. Or again, it may soon become evident to him that running his own business leaves him with too little leisure time for enjoying life in the casual way a nine-to-five o'clock man frequently does.

To balance the picture, let's consider the advantages.

Other things being equal, he will find that he can make more money as an employer than he will ever earn as an employee. And money, even at the current tax rate, is still a mighty comforting thing to have around the house.

He will have a degree of security far greater as an employer than he can possibly have as an employee. There is nothing in this world that is a greater illusion on the part of more people than the feeling of so many employees that they possess "security" in their jobs. Because they have given time and attention to a job over a period of years, many somehow feel that they have made their jobs permanent. Nothing of the sort. The job has given them a weekly pay check, an annual vacation, and perhaps even an annual bonus. But it should be remembered that this constitutes payment in full. Any one of a thousand circumstances can terminate the job at any time—circumstances over which the employee has little or no control and from which he has no recourse.

And He Can Develop

Consequently, as an employer, a person will have a greater measure of security. Of course, the risks are larger, the need for skill and courage greater. But because he is his own pilot, and therefore able to exercise more control over events, the individual's own security is greater.

As an employer, one's freedom to "expand" and develop himself is much larger than it can ever be when working for another person. The writer has often pondered the fact that in any gathering of men it is almost always possible to separate the employers from the employees with a high degree of accuracy on the basis of appearance alone.

Aura of Confidence

There often is a marked difference in personality and physical appearance between the man who owns his own business and the man who is working for another. There is no question of relative mental ability or intelligence involved. The difference is almost entirely an expression of an inner confidence in one's ability to face the world alone and be able to make a go of it. The employer invariably has that feeling and shows it in many subtle, as well as in many obvious ways. Almost as invariably, the employee lacks such a feeling—and shows it outwardly where it is apparent to all.

Perhaps the above may appear as an over-simplified statement of the case. Nevertheless, this writer's opinion is that the odds are all in favor of being the employer, provided the man has the temperament, the courage and the training to undertake it. From long personal experience with food technologists, one is amazed how many have what it takes to build a business for themselves and yet are content to do no more than drag down the weekly pay check.

It has always been a source of considerable astonishment that so many of our food manufacturing companies

have been started and, be it said in all fairness, carried well along the road to prosperity by nontechnical people. Actually, there have been times when this fact has been a source of some personal embarrassment.

Most companies, of course, eventually hire chemists and food technologists and other assorted specialists. Significantly, however, business firms are not as a general thing founded by the bright college graduates of the physical sciences. Very few indeed of the major companies—or smaller companies either—now in business were started by what we would call food technologists.

Little Men Who Weren't There

There have been, among both the older and the newer firms, some rather sensational successes in the food field over the last 30 years. It would seem by all the rules of logic that educated technical brains ought to have launched most of these whizbangs of food technology. The sad truth, of course, is that this just is not the case. In fact, hardly a one of these companies was sparked into action by the holder of an IFT card. Why should this be so?

The reason for such a state of affairs is relatively simple, and is in no way connected with any alleged lack of business "savvy" or "know-how" on the part of the well-trained technical man. The time has long since passed when there was even a tinge of truth to that hoary old canard. The food technologist, as an individual, possesses just as much business acumen as his nontechnical brother. Then why does he not use this ability with the same drive and persistence as the nontechnical man?

Schooling Extracts Enterprise

Here's why. Somewhere along the educational treadmill that went into the making of the B.S. or the Ph.D., the young food technologist had all the enterpriser spirit knocked out of him. Perhaps "knocked out" is too strong a term. Actually it was sort of extracted from him in a hundred half noticed, almost painless episodes and encounters. He was told early and late by the professors, by his textbooks, by the alumni (who at least should have had better sense), and by the man behind the desk up at the University Placement Office that the food technologist's role in life is to invent, to formulate, to control quality, to develop new processes and products, to supervise, to administer and to manage in some small degree the affairs of his employer. In short, his niche is to be a good, smooth-running cog in the corporate machine.

Practically no one, least of all his professors, ever told the young technologist that it might pay off better to develop his own spirit of individualistic enterprise.

The result of all this ballyhoo about being a good corporate cog is, naturally enough, a conviction on his part that what he hears is gospel truth, every word. He accepts his destiny pretty much as the professors have pointed it out and thereupon sets his sights on heading a department at Mammoth Mills, Inc.

Didn't Know They Couldn't

What about the smart nontechnical man? What about the salesman who knows that "anybody can make the product but the profit isn't there until it's sold"? What about the smart promoter who had to take a special exam to get out of high school and then wisely decided that any more education would be a hindrance in his drive toward success as a chain-store magnate? Admittedly, none of them knows too much about being a good cog in the corporate machine, but nevertheless they are doing all right. They're enterprisers from the word "go," all of them. That, to the best of this writer's knowledge and belief, is the basic reason why they are doing all right.

When these enterprising characters want to hire technical brains, they know it can be done easily enough. Moreover, the possessors of the technical brains will say "Yes, sir" and "No, sir" at just the right times and be very happy indeed to be on the enterpriser's payroll.

A Sad State of Affairs

This state of affairs is completely screwy. Many food technologists have far more business ability than they realize or make use of in their work. Likewise, the application of that business ability to the specific problem of setting up their own enterprises is not nearly so difficult or complicated as they have been led to believe. The transition from employee to employer has been, for many of those who have made it, much easier than anticipated.

What is mostly needed to make the transition is *courage*, continuity of effort, *courage*, an understanding of the basic business and technical skills required by the particular type of venture, *courage*, some cash backing, and finally, *courage!*

There are a great many people who will tell you that the day when a small business can be established is past and gone. That is a lot of bunk. It is undoubtedly harder to break in today than it was in the dear dead yesterday. But then it has always been harder to start today than it was yesterday. Regardless, the cheering fact remains that businesses do get started today and a fair percentage prospers.

In our town a party was held recently to celebrate the opening of a new ultramodern food warehouse by a young man who has built up a flourishing chain of super-markets in the last 12 years. In another part of our state, which by the way is not large, a charming woman has brought well along the road to success a firm specializing in condiment specialties. Still another woman in our state is internationally known for the breads her company bakes. These are all contemporary ventures—not something started way back in the days of the second Cleveland administration, the mustache cup and our grandfathers.

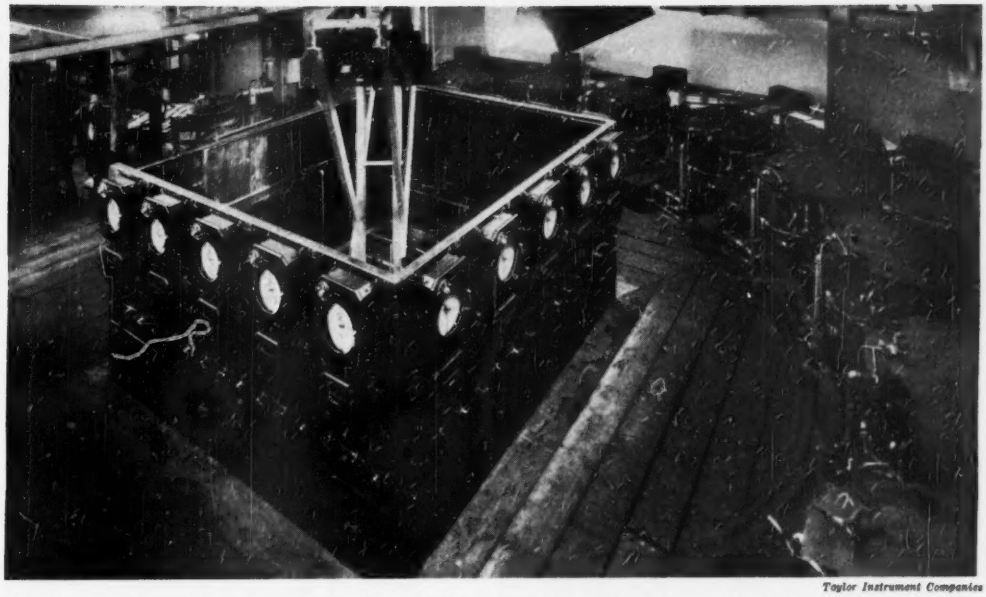
Every city and every state can offer examples of this same type of business enterprise. It is the writer's contention that the food technologist should look ahead to the possibility of using his training for himself by becoming an employer. This country can support a number of smaller businesses of exactly the type which the smart, well-trained food technologist is ideally suited to establish and run.

Hats Off To Business Men

Nothing in this little piece is intended to disparage the business accomplishments of groups other than food technologists. As a matter of fact—and it is quite plainly evident in all that has been said—the writer's hat is off to the Italian chef who built a really sizable fortune out of a packaged spaghetti dinner and canned ravioli. The same goes, doubled in spades, for the sales manager who finally said "Nuts!" to the idea of continuing to work for someone else and went out and proceeded to do very well indeed with his own line of packaged cake mixes. In all sincerity, salutations are extended from this corner to the business man who started a few years back on a shoe string and a barrel of corn syrup and is now the bubble gum king of the world. All these individuals are fine people, and all of them now employ good technical brains who work assiduously for them in the factories built by the enterpriser's enterprise.

But, friends, it would gladden this writer's heart immeasurably if in some of these cases the technical man was the hero of the success story. Not the unsung hero, but the guy who gets written up in the public prints, who speaks to the Rotary Club and who winds up eventually as a director of the First National Bank.

It would, truthfully, be nice to read some time, somewhere, that a food technologist, founder of a phenomenally successful firm, had just hired a bubble gum king.



Taylor Instrument Companies

HERE is central panel board as installed for controlling operation of a large battery of retorts (seen ranged around board). Instruments automatically regulate, indicate and record changes in process variables during retorting cycle.

Gets 20% Boost by Going Automatic

Instrument control of retorting reduces cannery's time on this task and cuts losses. Product-quality regulation is also improved

IVAN C. MILLER
Editorial Consultant, "Food Industries"

Through the introduction of automatic controls — comprising time, temperature, and pressure regulating instruments — production capacity of a battery of 26 retorts has been increased approximately 20 percent at the plant of P. J. Ritter Co., Bridgeton, N. J.

In addition, the use of these instruments has measurably improved product-quality control, especially in the retorting of products packed in glass.

The retort operation on glass-packed goods not only requires application of sufficient heat to effect sterilization but also calls for regulation of the pressure in keeping with the temperature to insure against breakage of the jars or loosening of the caps.

Details of the retort controls adopted at Ritter's and explanations of how they function are offered in the following paragraphs, and to simplify matters, the discussion will be divided into three parts—first, the period of coming up to the cooking temperature; second, the cooking; and third, the pressure cooling.

Coming Up to Cook Temperature

To prevent temperature shock to the glass, the retort is first filled to the proper level with preheated water. Three crates of sealed jars now go inside. Then before closing the retort the operator makes certain that the three-way TV-7 transfer valve (see hookup diagram) is at the "off" position and that the three-way TV-8 transfer valve is at the water position.

Under these conditions, air passes through pilot valve PV-9 to the top diaphragm of "air-to-close" control valve VPIC-5, causing it to shut. Control valves VTRC-2, VTRC-3, and VPIC-6 are all "air-to-open" valves, consequently are closed, since no air can reach them. The operator also adjusts the dial of the process timer to the desired time of cook. Then the retort lid is closed and bolted.

The come-up process begins when the operator puts TV-7 to the "on" position and opens hand valve HV-11. This action supplies air to both controllers TRC-1 and PIC-4, and to the base of pilot valve PV-9. The inner valve of PV-10 is in the top position, since the output of TRC-1 is at the maximum.

Output of temperature controller TRC-1, which is reverse acting, actuates control valves VTRC-2 and VTRC-3, which are both full-open during the come-up period. The range of control valve VTRC-2 is 7-19 psig., being fully opened at 19 psig. Range of the control valve VTRC-3 is 4-12 psig. and is fully opened at 12 psig. Pressure indicator-controller PIC-4 actuates control valve VPIC-6, operating with a range of 10-19 psig., and also control valve VPIC-5, which is a double diaphragm with a range of 2-9 psig.

At the beginning of the come-up

period, the set point of pressure controller PIC-4 is adjusted to approximately 25 psig., which assures the retort pressure being several psi. above the jar's internal pressure. If the pressure becomes too high, the output of PIC-4 opens valve VPIC-6, which in turn opens the retort to the drain. If the pressure goes below the set point, valve VPIC-5 opens and allows high pressure air to enter the retort.

The retort comes to the cook temperature in approximately 2½ min., since both steam valves are open. Steam from control valve VTRC-3 passes through the ejector, which pulls air from the top of the retort and assists in circulating the water as the steam and air mix and pass through the holes in the distributor located at the base of the retort. Circulation has always been a major problem in obtaining good retort control and satisfactory heat distribution. Our table (at foot of page), showing temperatures at various points in the retort, gives evidence that heat distribution is adequate and temperature control satisfactory. Furthermore, a come-up time of 2½ min. when packing glass is a considerable improvement on earlier methods.

Cooking Is Timed

When the retort has reached the cook temperature, the process timer begins to function. A red light goes on to indicate to the operator that the cook period has begun. As the control point is reached, the inner valve of pilot valve PV-10 drops, allowing a metered amount of air to pass out port C to the base of the retort. The air assists the circulation during the cook period, since the ejector is inoperative with the small flow of steam necessary to maintain the cooking temperature. Control valve VTRC-2 is closed during the cook period, and at the end, the process timer shuts off with the indicator at the zero position, and the red signal light goes out. This action cuts off the air supply to the temperature controller, and the two steam valves close.

During the cook period, the pressure controller has been maintaining the pressure in the retort through action of valves VPIC-5 and VPIC-6. This control insures that jar lids will not be distorted or forced off and the contents lost.

Pressure Cooling

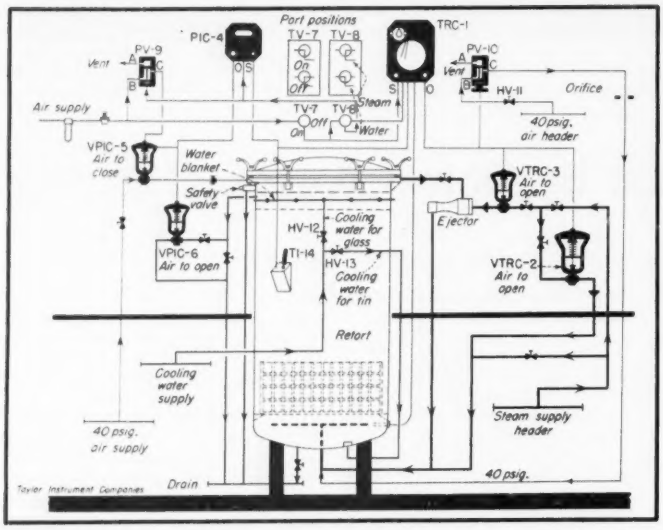
When the red light goes off, the operator knows the cooking period is over. He then opens the hand valve HV-12, which admits cooling water to the top of the retort. Again, pressure control plays an important part—to regulate pressure with respect to temperature during cooling. Pressure controller PIC-4 actuates control valve VPIC-6, allowing a sufficient amount of hot water to flow to the drain to maintain a positive pressure until the retort and its contents are cool.

When the retort is sufficiently cooled to allow removal of cooked products without loss of jar lids, the operator closes water valve HV-12, turns transfer valve TV-7 to the "off" position, and closes high pressure air valve HV-11. Excess pressure and water are removed by opening the bypass valve around control valve VPIC-6. The crates of jars are removed and pass along a cooling canal to bring them down to room temperature.

Before instruments were installed on these retorts, it was necessary to manipulate several outlet valves in order to cool properly without loosening jar lids. This consumed anywhere from 20 to 30 min. In contrast, the new cooling is safely accomplished in 12 to 15 min.

The improved control system has reduced the overall time on retorting as well as time of come-up and cooling, thereby increasing productive capacity of the equipment.

Hookup of Controls and Salient Temperature-Test Data



FUNCTIONING of new retort system is depicted in this diagramatic hookup of controls. Indicated are various valves, also air, steam, and water lines.

TABLE—HEAT-DISTRIBUTION TESTS With Measurements in Deg. F. Made at Various Points when Retort Contained Full Load of Glass-Packed Products

			Temperatures Recorded by Thermocouples**										
			0	1	2	3	4	5	6 Middle Crate	7	8	9 Top Crate	10
Time* (Min.)	Chart Record TRC-1	Mercury Thermom. TI-14	Thermom. Bulb	Mercury Thermom.	Bottom Side	Retort Bottom Center	Crate Top Center	Side	Bottom Center	Top Center	Side	Bottom Center	Top Center
0	178	179	179	179	180	180	181	180	180	179	178	179	179
3	240	240	241	241	242	241	241	241	240	240	240	240	241
6	239½	240½	241	241	242	241	241	241	241	241	241	241	241
9	240	241	241	241	242	242	242	242	241	242	242	242	242
12	240	241	241	241	242	242	242	242	242	242	242	242	242
15	240	241	241	241	242	242	242	242	242	242	242	242	242
18	240	241½	242	242	242	242	242	242	242	242	242	242	242
21	240	241½	242	242	242	242	242	242	242	242	242	242	242
24	240	241½	242	242	242	242	242	242	242	242	242	242	242
27	240	241½	242	242	242	242	242	242	242	242	242	242	242
30	240	241½	241½	241½	241½	241½	241½	241½	242	242	242	242	242
33	200	...	204	210	206	208	200	195	195	200	185	185	185
36	175	...	175	185	175	175	175	170	180	170	170	165	160

* Steam shut off at end of 31 min., ejector started to operate at 200 F. Come-up-time, 2 min. 7 sec.
** Connected with multi-point indicating potentiometer.

Meat-Color Problem Is Closer to Solution

Prepackaging research is now putting finger on wrappers and antioxidants most effective in checking discoloration

A. A. KRAFT and J. J. WANDERSTOCK
School of Nutrition & Department of Animal Husbandry, Cornell University, Ithaca, N. Y.

True, the prepackaged, self-service meat business is now moving along at a great clip. But before the throttle can be opened farther, it will be necessary to find really sure-fire ways to curb discoloration.

Briefly, the meats—as now commonly prepackaged—lose color too soon after wrapping, cutting down shelf-life in the store and also keeping qualities in the home.

This situation led to an anti-discoloration investigation at Cornell University. And results after careful tests with round steak and smoked ham have indicated that—

- Of the wrappers tested, rubber-base film was the best for fresh meat, cellophane for cured meat.
- Of the antioxidants considered, NDGA (0.01 percent) was most effective for the fresh meat. But these chemical agents were not as effective in the case of cured meat.

Factors Affecting Color

Proper control of temperature is important not only for preserving the quality of meats, but also for inhibiting discoloration. In the case of fresh red meats, the temperature should be slightly above freezing, while smoked meats keep best at about 38 to 40 deg. F.[1]

Discoloration also seems to be dependent upon the intensity and length of exposure to light.[2] Probably the best light for use in displaying these meats is that from the ordinary incandescent bulb. Ultra-violet light has a bad effect on the color of meats, particularly luncheon meats.

Fundamentally, both the grade and color of lean beef are influenced by the method of feeding the animals.[3] The breed of animals and the efficiency of the slaughtering and pre-slaughtering operations also affect the color of beef.[2]

Even more important is the length of time the cut of beef has been exposed to air before packaging. When cut, fresh beef has a purple-red hue—the true color of the flesh. But this color rapidly changes to a bright red, due to oxygenation of myoglobin present in the meat. If the meat is wrapped directly after it is cut—before the formation of oxymyoglobin—some wraps will never permit this reaction. Others that are slightly permeable to oxygen will eventually allow this reaction to take place. In still others, a reaction will occur between certain chemicals in the wrapper and meats, causing "off" colors.

FRESH, PALATE-APPEALING prepackaged meats are gaining new popularity daily. And even greater demand is foreseen through increased retention of that freshness and appeal. (Sylvania Div., American Viscose Corp. photo)

Plastic films for packaging can be classified according to the materials from which they are manufactured: (1) Cellulose derivatives, (2) vinyl resins, and (3) rubber-base (rubber hydrochloride) films.[4]

Films from cellulose are most common. These are transparent, highly flexible, strong enough to offer a high degree of physical protection, and generally impervious to grease. But they are not proof against moisture vapor. Water droplets forming inside such packages go through the film, leaving the wrapper dry and transparent instead of partly opaque.

Compared to other films, the vinyls, including vinyl chloride, have a high water-vapor retention. Some are odorless and tasteless, and they offer maximum resistance to grease and chemicals.

Rubber-base films are desirable wrappers for many foods. Besides their imperviousness to the moisture vapor, they have a high tensile strength that can be further increased for low temperature storage by varying the formula of the film. These films are also heat-sealable, and they can be made either transparent or colored. In addition, they are not affected by the ordinary hazards of a food package, such as grease, oil, or dilute acids. And their impermeability enables them to retain flavors.

Discoloration Reaction

Canadian workers attempted to show that the discoloration of red meats was caused by the meat reacting with the coating on cellophane.[5] But results indicated that all wrappers gave this reaction. Discoloration was due to the formation of methemoglobin, which gives the meat a dark brown color. But this discoloration can be retarded by using a suitable reducing agent, such as sodium bisulphite.

Retention of the color of fresh beef is a special problem, since beef has a darker color than other meats.[6] Many properties of the packaging material are involved in color retention. Research by the du Pont laboratories has shown that, in addition to oxygen permeability, importance also attaches to low water vapor permeability and a certain degree of water absorption.

A specific cellophane was shown to be effective in retaining the color of fresh meat for 72 hr. and longer at 34 to 40 deg. F. This film has a "wettable" surface which must be in contact with the meat. Properties of this surface are a certain degree of water absorbency and low oxygen permeability. The film also has a relatively low water permeability, which is important because excessive drying of the surface of the meat contributes to color changes. Bacterial and enzymatic action also add to these changes. If the

Pertinent Data Show How Various

TABLE I—Changes in the Color of Round Steaks Treated With Various Antioxidants and Packaged With Wrappers Specified.

A. With Cellophane A Wrapper

Change in Color

Time in Hours	Mean of 4 Lots 0.01% NDGA	Mean of 2 Lots 0.015% NDGA	Mean of 5 Lots Antioxidant 2	Mean of 5 Lots Antioxidant 4	Mean of 5 Lots Antioxidant 3	5 Lots Controls	Sum of 6 Treatments	Mean	Sum of Squares—6 Treatments
8	0.50	−0.50	−0.20	−0.20	−0.80	−0.60	−1.80	−0.30	1.580
24	−0.25	−0.50	0.80	0.40	−0.20	−0.20	0.05	0.01	1.193
48	0.25	−0.50	1.60	1.80	0.00	0.80	3.95	0.66	6.753
72	1.25	0.50	1.80	2.00	0.80	1.60	7.95	1.33	12.253
96	2.00	0.50	2.20	3.20	1.40	2.40	11.70	1.95	27.050
120	2.00	1.00	3.40	3.60	2.00	2.40	14.40	2.40	39.280
144	2.75	1.50	4.00	4.40	2.80	3.00	18.45	3.08	62.013
Sum of observations	8.50	2.00	13.60	15.20	6.00	9.40	54.70	....	.....
Mean	1.21	0.29	1.94	2.17	0.86	1.34	.....	1.30	.....
Sum of squares	17.50	4.50	38.88	50.00	15.12	24.12	.....	....	150.122

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares
Total	41	78.882	1.924
Between mean of antioxidants	5	16.847	3.369
Between means of hours	6	56.543	9.424
Remainder, interaction	30	5.492	0.183

$$F = \frac{3.369}{0.183} = 18.4$$

Figures in each column are mean color changes for number of lots in which each antioxidant was used. Negative numbers indicate an improvement in color as compared with initial observation.

B. With Cellulose Acetate Wrapper

Change in Color

Time in Hours	Mean of 4 Lots 0.01% NDGA	Mean of 2 Lots 0.015% NDGA	Mean of 5 Lots Antioxidant 2	Mean of 5 Lots Antioxidant 4	Mean of 5 Lots Antioxidant 3	5 Lots Controls	Sum of 6 Treatments	Mean	Sum of Squares—6 Treatments
8	0.75	0.50	0.40	0.40	0.80	0.20	3.05	0.51	1.813
24	0.75	2.00	1.80	0.80	1.40	1.80	8.55	1.43	13.643
48	3.25	3.00	3.00	2.80	3.60	3.20	18.85	3.14	59.603
72	4.50	5.00	5.60	4.00	4.40	5.60	29.10	4.85	143.330
96	5.75	5.00	6.80	5.20	6.00	6.60	35.35	5.89	210.903
120	6.25	5.50	6.80	5.40	6.00	6.80	36.75	6.13	226.933
144	6.25	6.00	7.00	5.80	6.40	7.00	38.45	6.41	247.663
Sum of 7 observations	27.50	27.00	31.40	24.40	28.60	31.20	170.10	....	.....
Mean	3.93	3.86	4.49	3.49	4.09	4.46	.....	4.05	.....
Sum of squares	143.125	129.500	185.240	114.480	147.880	183.680	.....	....	903.905

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Total	41	215.000	5.244
Between means of antioxidants	5	5.091	1.018
Between means of hours	6	204.949	34.158
Remainder, interaction	30	10.051	0.335

$$F = \frac{1.018}{0.335} = 3.04$$

C. With Rubber-Base Film Wrapper

Change in Color

Time in Hours	Mean of 4 Lots 0.01% NDGA	Mean of 2 Lots 0.015% NDGA	Mean of 5 Lots Antioxidant 2	Mean of 5 Lots Antioxidant 4	Mean of 5 Lots Antioxidant 3	5 Lots Controls	Sum of 6 Treatments	Mean	Sum of Squares—6 Treatments
8	−0.75	0.00	0.40	0.00	0.20	0.40	0.25	0.04	0.923
24	−0.75	0.00	0.20	0.00	−0.20	0.60	−0.15	−0.03	1.003
48	0.00	0.00	0.60	0.20	0.20	0.60	1.60	0.27	0.800
72	0.25	1.00	0.60	0.60	0.40	1.60	4.45	0.74	4.503
96	0.25	1.00	1.40	1.40	1.00	2.80	7.85	1.31	13.823
120	1.00	1.50	1.80	1.80	2.00	3.00	11.10	1.85	22.730
144	1.50	2.50	2.00	2.20	2.00	2.80	13.00	2.17	29.180
Sum of 7 observations	1.50	6.00	7.00	6.20	5.60	11.80	38.10	....	.....
Mean	0.21	0.86	1.00	0.89	0.80	1.69	.....	0.91	.....
Sum of squares	4.500	10.500	10.120	10.440	9.280	28.120	.....	....	72.960

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Total	41	38.398	0.937
Between means of antioxidants	5	7.765	1.553
Between means of hours	6	28.151	4.692
Remainder, interaction	30	2.482	0.083

$$F = \frac{1.553}{0.083} = 18.7$$

TABLE I (Cont'd.)—Changes in the Color of Round Steaks Treated With Various Antioxidants and Packaged With Wrappers Specified.

D. With Cellophane B Wrapper

	Change in Color								
	Mean of								
Time in Hours	4 Lots 0.01% NDGA	2 Lots 0.015% NDGA	5 Lots Anti-oxidant 2	5 Lots Anti-oxidant 4	5 Lots Anti-oxidant 3	5 Lots Con-trols	Sum of 6 Treatments	Mean	Sum of Squares—6 Treatments
8	−0.25	1.00	1.00	0.00	1.00	1.80	4.55	0.76	6.303
24	0.50	2.00	1.00	0.60	1.40	2.00	7.50	1.25	11.570
48	1.25	3.00	2.20	1.00	1.80	2.40	11.65	1.94	25.403
72	1.75	3.50	2.60	1.60	2.60	3.20	15.25	2.54	41.633
96	2.25	4.00	3.40	2.20	3.20	4.00	19.05	3.18	63.703
120	3.50	3.50	3.60	2.60	3.60	4.40	21.20	3.53	76.540
144	3.75	3.50	3.60	2.80	3.60	4.40	21.65	3.61	79.433
Sum of 7 observations	12.75	20.50	17.40	10.80	17.20	22.20	100.85	....	.....
Mean...	1.82	2.93	2.49	1.54	2.46	3.17	.....	2.40	.....
Sum of squares	36.313	66.750	51.080	23.360	49.120	77.960	.....	....	304.583

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Total	41	62.423	1.523
Between means of antioxidants	5	13.682	2.736
Between means of hours	6	45.557	7.593
Remainder, interaction	30	3.184	0.106

$$F = \frac{2.736}{0.106} = 25.8$$

TABLE II—Mean Color Changes for the 144-Hr. Period in Round Steaks Treated With Various Antioxidants and Wrapped With the Four Films

	Change in Color						
Antioxidants	Cellophane A	Cellulose Acetate	Rubber Base	Cellophane B	Sum of 4 Papers	Mean	Sum of Squares of 4 Papers
0.01% NDGA..	8.50	27.50	1.50	12.75	50.25	12.56	993.313
0.015% NDGA.	2.00	27.00	6.00	20.50	55.50	13.88	1,189.250
Antioxidant 2...	13.60	31.40	7.00	17.40	69.40	17.35	1,522,680
Antioxidant 4...	15.20	24.40	6.20	10.80	56.60	14.15	981.480
Antioxidant 3...	6.00	28.60	5.60	17.20	57.40	14.35	1,181.160
Controls.....	9.40	31.20	11.80	22.20	74.60	18.65	1,693.880
Sum of 6 treatments.....	54.70	170.10	38.10	100.85	363.75	.....	.....
Mean.....	9.12	28.35	6.35	16.81	.....	15.16	.....
Sum of squares of 6 treatments	616.610	4,857.970	296.290	1,790.893	.....	.....	7,561.763

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Total	23	2,048.678	89.073
Between means of papers	3	1,744.987	581.662
Between means of antioxidants	5	108.203	21.641
Remainder, interaction	15	195.488	13.033

$$F = \frac{581.662}{13.033} = 44.63$$

TABLE III—Color Changes for the 72-hr. Period in Hams Treated With the Various Antioxidants and Wrapped With Six Films

	Change in Color								
Wraps	0.01% NDGA	0.015% NDGA	Anti-oxidant 2	Anti-oxidant 4	Anti-oxidant 3	Con-trols	Sum of 6 Treatments	Mean	Sum of Squares—6 Treatments
Cello. B	5.6	5.6	5.6	5.8	6.4	5.9	34.9	5.8	203.49
Cello. C	5.2	5.7	5.3	5.6	5.7	5.4	32.9	5.5	180.63
Cello. D	5.2	5.0	5.6	5.5	5.5	5.8	32.6	5.4	177.54
Cello. E	4.8	4.7	5.2	5.3	5.1	6.0	31.1	5.2	162.27
Cellulose acetate	5.5	6.3	5.9	5.6	5.7	6.0	35.0	5.8	204.60
Rubber base	5.8	5.7	5.4	5.4	5.7	5.8	33.8	5.6	190.58
Sum of 6 papers	32.1	33.0	33.0	33.2	34.1	34.9	200.3	....	.....
Mean	5.4	5.5	5.5	5.5	5.7	5.8	.....	5.6	.....
Sum of squares of 6 papers....	172.37	183.12	181.82	183.86	194.69	203.25	.....	....	1,119.11

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Total	35	4.66	0.133
Between means of antioxidants	5	0.80	0.160
Between means of wraps	5	1.86	0.372
Remainder, interaction	25	2.00	0.080

F value for antioxidants $= \frac{0.160}{0.080} = 2.00$ F value for papers $= \frac{0.372}{0.080} = 4.65$

material has a low water vapor-permeability, a high relative humidity may be maintained within the package.

Color Change in Cured Meats

In prepared and cured meats, the color problem differs greatly from that of fresh meats. The color of prepared meats is subject to "fading" when these foods are exposed to light and air. Fading is dependent upon the intensity and length of exposure to light.

Color changes in cured meats may be controlled by proper packaging methods.[7] Discolorations caused by dehydration can be checked with a suitable wrap. One that is completely impermeable to moisture would be most effective. But microbiological action prevents use of such a wrap.

Cured meats are also subject to serious discoloration by chemical action. Pigments in these meats are nitric oxide derivatives of the hemoglobin or myoglobin. Oxidation of these pigments is greatly accelerated by light, causing the meat to turn brown or gray.

The reaction for nitric oxide hemoglobin is:

$$\underset{Fe^{++}}{NOHb} + O_2 \longrightarrow \underset{Fe^{+++}}{MetHb}$$

In cases where opaque packaging materials are not applicable, exclusion of oxygen seems to be the only procedure to follow. A vacuumized package gave best results when cellophane, Pliofilm, aluminum foil, and vacuumized wraps were tested. Color protection of sliced boiled ham is best secured through the exclusion of light or oxygen.

Air oxidation of nitric-oxide myoglobin proceeds more rapidly at lower pH values. It is appreciably retarded at a pH of 8.25. Nitric-oxide myoglobin is easily attacked by atmospheric oxygen, but the mechanism of the oxidation to metmyaglobin appears to be such that there is no optimum pressure for the reaction. The rate of reaction is proportional to the oxygen pressure. This phenomenon differs from that taking place with the natural pigment hemoglobin, which does have a definite optimum pressure for oxidation.[8]

Antioxidants and Color Changes

Nordihydroguaiaretic acid (NDGA) would be expected to have antioxygenic properties, since the hydroxyl groups are in the ortho position.[9] When the hydroxyl groups of the phenolic compounds are in either the ortho or para position, they are active. And when these groups are in the meta position, the compound does not have antioxidant properties.[10]

In extensive toxicity experiments, NDGA proved harmless in amounts

far in excess of that required to prevent the oxidation of fat over extended periods of storage.[9]

NDGA has been successfully used in retarding rancidity in lard, bacon, and salt-cured fish. It is also effective in delaying the oxidation of fatty acid esters, stabilizing carotene in vegetable oils, and retarding oxidative changes in vegetable oils and frozen cream.

Other antioxidants are superior in retaining the stability of animal fats.[11] These antioxidants were developed by the Tennessee Eastman Corp. in cooperation with the American Meat Institute Foundation.

Referring to Table V, antioxidant 2 is a food inhibitor grade of hydroquinone. Antioxidant 3 is the food inhibitor grade of butylated hydroxyanisole. Antioxidant 4 is a propylene glycol solution of antioxidants 2 and 3 and citric acid. The composition of antioxidant 4 is as follows: 0.01 percent butylated hydroxyanisole, 0.003 percent hydroquinone, and 0.002 percent citric acid.

Butylated hydroxyanisole, in combination with hydroquinone and an acid synergist, is a superior antioxidant for animal fats. Extensive studies on the toxicity of these antioxidants have shown that they can be safely used in foods.

About the Procedure

Five lots of round steak, all of about the same quality, were selected (Table I-A) for the tests. It will be noted, however, that Lot V graded "choice", while the other four lots were "commercial". This difference undoubtedly influenced the color change and the effectiveness of the treatments. In all cases, 100 to 150g. samples were chosen at random from the top round cut. During the packaging of each lot, the wraps were rotated so that no one film was consistently used as the first packaging material. This was done to equalize the time of exposure prior to wrapping with each film.

Wraps used were cellophane A, cellulose acetate, a rubber-base film, and cellophane B. These wraps afford some moisture-vapor retention, and all are heat-sealable. The cellulose-acetate wrap is highly gas permeable, allowing for rapid passage of oxygen through it.

Antioxidants used included nordihydroguaiaretic acid (NDGA), and antioxidants 2, 3, and 4. NDGA was used in two concentrations by weight: 0.01 percent in Lots I, II, III, and V, and 0.015 percent in Lots IV and V. Antioxidants 2, 3 and 4 were used in concentrations of 0.025 percent by weight. The concentrations of NDGA were varied to determine the optimum level for color retention.

Color was judged visually with the Munsell color panel (meat scale A) with grading from 1 to 10 in order of increasing darkness. This panel was developed for checking adult beef 30 min. after brightening, and was prepared for the National Livestock & Meat Board.

Meat samples were exposed to light from four 30w. white fluorescent bulbs (Mazda) at a distance of 17 in. below the bulbs and at 90-deg. angle.

Antioxidants were dissolved in a filtered coconut-oil carrier and brushed on the surface of the meats (this technic giving a more uniform coating than dipping). Meats were then wrapped and stored at 32 to 36 deg. F. Observations were made 8, 24, 48, 72, 96, 120 and 144 hr. after packaging. Control (untreated) samples were handled in the same way.

Testing Smoked Hams

Except for differences in the size of the meat samples and packaging materials, smoked hams were treated in the same manner as round steaks.

Ordinary smoked hams were used in Lot I and pre-cooked smoked hams in Lots II and III. In Lot I, one 50g. sample and two smaller ones were similarly treated, making three samples for each treatment, or a total of 72 for the lot. Although color changes in the smaller samples corresponded closely to those in the larger ones over a 3-day period, both sizes of samples were used in subsequent studies. A small and large sample were used for each treatment in Lots II and III—48 samples in each lot.

Since the color-change reaction was more rapid in ham and it seemed to end earlier than in round steak, observations were only made after 8, 24, 48 and 72 hr.

In Lots II and III, cellophanes C and D were substituted for cellulose acetate and cellophane B. The former packaging materials have a higher degree of moisture-vapor retention, thus they could be expected to minimize discoloration.

Samples of hams were treated with antioxidants used for round steaks, and held at 32 to 36 deg. F. NDGA was used in concentrations of 0.01 and 0.015 percent by weight. Control samples were packaged without antioxidant treatment, and stored with treated ones.

Antioxidants Prove Effective

In some instances, the color of round steaks improved in the first 8 to 24 hr. This change might be attributed to the action of antioxidants with oxygen in the package, resulting in a brighter red color than that noted during packaging. However, since color was judged visually, this improvement might be due to experimental error.

Antioxidants were most effective for checking color changes in round steaks during the first 24 to 48 hr. NDGA (0.01 percent) inhibited color changes in round steaks for 144 hr. In a 0.015 percent concentration, NDGA was not as effective. Antioxidant 4 did a good job of retaining the color of round steaks. But antioxidant 3 was generally not as effective, and antioxidant 2 was least efficacious. All the antioxidant-treated samples, wrapped in one or more of the films, retained color better than did untreated ones.

Significant color retention was not shown in any of the antioxidant-treated smoked hams, as compared with control samples. But the mean color change for treated samples was less than for untreated ones.

Among packaging materials, rubber-base film gave the best color retention in round steaks. Cellophane A gave good color retention, while cellophane B was somewhat less effective. Cellulose acetate preserved color the least. Differences among wrapping materials were significant.

In the smoked-ham tests, cellophane E was best. And cellophane D also compared favorably with it. Cellophane B, cellulose acetate, cellophane C, and rubber-base films were less effective in inhibiting color changes. Cellophane E is recommended for cured meats, whereas other cellophanes tested are better for fresh meats.

Round steaks packaged in films affording greater retention of color also responded to antioxidant treatment to a greater degree than samples packaged in films allowing for greater color change.

Statistical Tests

In the statistical study made of these results, the "F" value was employed for determining differences in color of meat due to antioxidant treatments (Tables I-A to I-D). A significant F value means that differences in color were induced by one or more of these treatments. This same test for significance has been used in comparing the effects of the different packaging materials on the retention (Table I-D).

The "t" value is a test for determining if any *particular* treatment differs significantly in color change from the control sample. When the t value is significant, the treatment in question has successfully retarded color changes.

Variations due to sampling may result in significant F or t values that are merely attributed to chance. To compensate for these variations, "levels of confidence" have been established to determine a truly significant value. A value significant at the 5-percent level of confidence will occur by chance 5 percent or less of the time. A value at the 1-percent level can be due to

chance only 1 percent of the time, and it is therefore more significant than one occurring at the 5-percent level.

Average Variation Determined

The concept of degrees of freedom refers to the number of observations that may vary after certain restrictions have been placed on the data. The number of degrees of freedom is one less than the number of cases in the sample. Here, for antioxidants, the number of degrees of freedom equals five, since there are six antioxidant treatments (including the control). Similarly, since seven observations were made for each treatment, the degrees of freedom for hours is six. The basic idea of degrees of freedom is to make the number of samples taken as nearly representative of an infinite number of samples as possible.

To obtain the average variation for each set of data, each measurement must be squared. The data alone do not provide satisfactory estimates. In respect of simplicity and for ease in computation, the measurements are squared and their sums taken for further calculation. Use of the sums of squares in the formula for testing significance tends to equalize all measurements so that they may be considered as coming from a normally distributed set of samples. The squares are well adapted to short cuts in computation.

Wrappers Show Differences

"Interaction" is the term to describe the phenomenon occurring when antioxidant treatments are used in combination with various packaging materials. The effect of antioxidant treatment is not always the same, but depends upon the wrapper used. This effect must be considered in the analysis when testing for significant differences among treatments.

Table I-A shows data for round steaks wrapped in cellophane A. The F value of 18.4 is significant at the 1-percent level of confidence, indicating important differences among antioxidants and hours of observation. Color change over a period of time is a recognized factor, and was not subjected to further analysis.

Each antioxidant was compared with the control. No difference was found between 0.01 percent NDGA-treated and untreated samples. The t value for 0.015 percent NDGA was 4.6, indicating a significant difference from the control at the 1-percent level. Untreated samples showed less color change than those treated with antioxidants 2 and 4. Antioxidant 3 had a t value of 2.09 when compared with the control, a difference significant at the 5-percent level of confidence.

Data for round steaks packaged with cellulose acetate are presented in Table I-B. The 3.04-F value, significant at the 5-percent level, is not as important as that observed for cellophane A. Concentrations of 0.01 percent NDGA and 0.015 percent NDGA were not different from untreated samples. Control samples had less change in color than those treated with antioxidant 2. The t value for antioxidant 4 was 3.13, indicating significant color retention at the 1-percent level when compared with the control. Antioxidant 3 did not differ from the control.

Table I-C presents data for steaks wrapped in rubber-base film. The F value of 18.7 is highly significant at the 1-percent level of confidence. On further analysis, it was found that all antioxidants showed greater color retention than untreated samples. The t value of 9.25 for steaks treated with 0.01 percent NDGA is highly significant. NDGA in a concentration of 0.015 percent had a t value of 5.2 when compared with the control; antioxidant 2 gave a value of 4.3; antioxidant 4, a value of 5.0; and antioxidant 3, a value of 5.6.

Data for samples packaged with cellophane B is presented in Table I-D. A highly significant F value of 25.8 was found. NDGA (0.01 percent) had a t value of 7.94 when compared with the control—a big difference in color retention. NDGA (0.015 percent) treated steaks and controls did not show much difference. Antioxidant 2 had a t value of 4.0, indicating a difference from the control at the 1-percent level. Antioxidant 4 gave a t value of 4.17, showing a difference from the untreated samples at the 1-percent level.

Data for packaging materials is presented in Table II. Figures in each column are the mean color change for the total period of observation. The F value of 44.63 represents a big difference among films at the 1-percent level of confidence. Inspection of the mean color change for each wrap indicates that the rubber-base film gave the greatest color retention, cellophane A ranked second, cellophane B third, and cellulose acetate resulted in the greatest color change.

Data for smoked ham samples are given in Table III. Figures in each column are the mean color changes of all lots for the 72-hr. period.

Mean vs. Individual

The 2.00-F value for antioxidants indicates no great differences among treatments. Since the values are the means of all lots in each treatment, they are not as representative as data for individual samples. If this study had considered individual samples, differences might have been found among treatments. The mean color change for all antioxidant-treated hams was less than for the control.

Packaging materials gave an F value of 4.65, indicating important differences in color retention. Compared with cellophane B, a t value of 3.75 was obtained with cellophane E—a big difference between these two wraps. Cellophane E compared with cellulose acetate gave a t value of 3.75, which is significant at the 1-percent level. Cellophane E compared with rubber-base film had a t value of 2.5, which indicates a difference between these materials at the 5-percent level.

When cellophane D was compared with cellophane B, a t value of 2.5 was obtained—a difference in color retention at the 5-percent level. Cellophane D compared with cellulose acetate had a t value of 2.5, indicating a difference at the 5-percent level of confidence.

Inspection of the means for other papers indicates that no significant differences could be expected between any two papers compared.

References

1. W. S. Shafer, "Prepackaged Self-service Meats", *The National Provisioner*, June 5, 1948.

2. R. O. Hockman, "Problems in Packaging Meat Products", *The National Provisioner*, Apr. 20, 1946.

3. J. J. Wanderstock and J. I. Miller, "Quality and Palatability of Beef as Affected by Method of Feeding and Carcass Grade", *Food Research* 13: 291-303, 1948.

4. D. R. French, "Packages and Containers for Marketing Foods," USDA, Bur. of Home Economics, 1945.

5. C. G. Lavers, "Discoloration of Packaged Red Meat", *Modern Packaging*, Jan. 1948.

6. N. Allen, "Meat Film Considerations," *Modern Packaging*, Jan. 1949.

7. W. M. Urbain and J. M. Ramsbottom, "Controlling Quality Changes in Cured Meats by Packaging, *"Food Research* 13: 432-439, 1948.

8. W. M. Urbain and L. B. Jensen, "The Heme Pigments of Cured Meats. I. Preparation of Nitric Oxide Hemoglobin and Stability of the Compound," *Food Research* 5: 593-606, 1940.

9. J. W. Stull, E. O. Herreid, and P. H. Tracy, "A Study of the Use of the Antioxidant Nordihydroguaiaretic Acid in Dairy Products. I. Its Antioxygenic Properties in Milk," *Journal of Dairy Science*, 31: 449-454, 1948.

10. H. A. Matill, "Antioxidants and the Autoxidation of Fats," *Journal of Biological Chemistry*, 90: 141-152, 1931.

11. H. R. Kraybill, B. W. Beadle, F. C. Vibrans, VeNona, Swartz, O. H. M. Wilder, and Helen Rezabek, "Studies on Antioxidants: I. AMI 72 A Superior Antioxidant for Animal Fats," American Meat Institute Foundation, Bull. 2, 1948.

12. G. W. Snedecor, "Calculation and Interpretation of Analysis of Variance and Covariance," Collegiate Press, Ames, Iowa, 1934.

The authors are indebted to Dr. W. L. Nelson, School of Nutrition, Cornell, for his helpful advice in planning the study, and to Dr. S. E. Smith and Dr. C. R. Henderson, Department of Animal Husbandry, for aiding in the statistical analysis.

Five Steps Must Be Taken To Solve Residue Problem

Significant information and decisions will come out of F&DA hearings. Enlightened cooperation of processors essential. Bad public reaction possible

R. S. McBRIDE
Consulting Editor, "Food Industries," Washington, D. C.

How much residue of toxic or deleterious material may properly remain on foods? No one will ever have a final answer to that question, but the Food & Drug Administration is starting toward a partial tentative answer in proceedings scheduled to begin January 17 in Washington.

The first part of what will be a long series of hearings will deal with the residues from sprays used for pest control on fresh fruits and vegetables. Thereafter will come the comparable hearing on fruits and vegetables which are to be processed by drying, freezing, canning or preserving.

The basic principles which underlie the solution of this problem are not essentially different, whether one is concerned with fresh spinach, prepackaged apples, grape marmalade, canned green beans, catsup, prunes, frozen broccoli, or a multitude of other goods. Hence, every processor of food who uses any of the fruits or vegetables at any stage, even as a minor component, is concerned with this proceeding from the very beginning. Some of the basic steps which are likely to be taken deserve our thoughtful consideration.

The Need for Sprays

Congress recognized, when it passed the 1938 Food & Drug Act, that many commodities could not be grown successfully unless toxic sprays were used for control of insect, fungus, and other attack. Knowing this basic fact, it provided in the law that the presence of unavoidable residues of such materials would not in itself constitute adulteration, even though a like quantity which might get into the food otherwise would be sufficient to warrant condemnation and destruction of the food.

It becomes essential as a first step in the tolerance hearings for F&DA to determine, with the aid of competent entomologists, just what spray materials may best be used in order that the primary grower of the fruit and the vegetable may expect to produce a good crop. The food officials will doubtless recognize such practices as being permissible. It is equally likely that officials will not tolerate any residue whatsoever of toxic materials which do not appear to be necessary. And even more certainly, any contamination of a food by materials of this sort will not be excused.

What Residue Results

The second step in the inquiry will deal with a very simple factual matter. The answers will not come easily, but they probably will be factual. Look at it this way:

When the farmer, the vineyard operator, or the orchard owner follows a proper and desirable pest control practice with a given chemical, how much of the spray material is likely to remain on the fruit or vegetable which goes to market or to the factory? Variation in farm practice, differences in weather and crop conditions, and a multitude of other factors will have to be appraised. But the answer will be determinable for each significant combination of commercial conditions.

The important part of the job of finding out the quantity of residue is, unfortunately, contingent on development of much better methods of chemical analysis. This is particularly true for the new organic pest control sprays. But work is underway, and more will be done. In due time the typical residue will be known. Then the third step may be taken.

Is Residue Removable?

To know how much spray of a given character is on the skin of an apple is not enough. We must know also how much of that spray residue will remain with the apple as it goes to market or as it goes into the food plant for processing. Well-established methods were developed years ago for washing and waxing apples. It is well known that much of the spray residue is readily removable. We do not have comparable knowledge for all other fruits and vegetables.

Obviously, F&DA will make a great distinction between the different types of uses. If apples are to be peeled and the peeling discarded without food or feed usage, then F&DA is not concerned as to whether spray residues remain on the skin as they go to the processing plant. They are concerned with the product which does become food. Furthermore, it makes a great deal of difference whether the commodity is one of large regular public usage or is only a condiment. Naturally, the easily removed residue on an apple skin is relatively unobjectionable compared with a comparable concentration on a broccoli flower or on other inaccessible parts of vegetables.

The Factory Problem

In this first proceeding, F&DA is dealing with fresh products that go to the housewife without factory treatment. So, at this third stage, there will be little or no attention to the factory problems created by residues. The main consideration will be what reaches the consumer. Nevertheless, factory problems are to be taken up later in the investigation. It is important that the initial stages of the proceedings be conducted with that in mind.

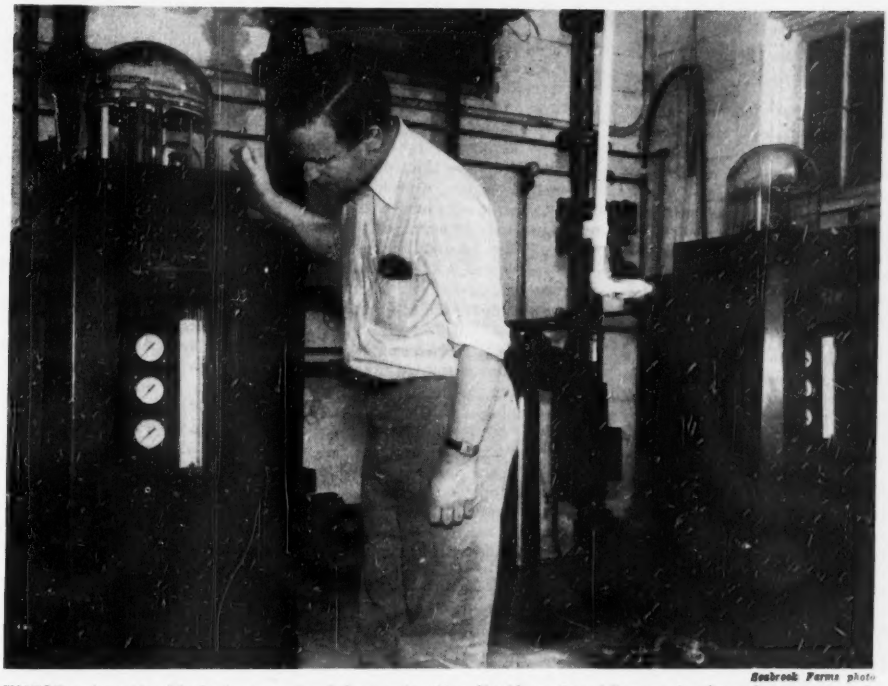
In the first place, it is vital that the public generally does not get the idea that food contaminated by residues can never be used in a processing plant. If alarmist conclusions are drawn from these early proceedings, they will handicap the processor in persuading people to use his products.

What Is Safe?

Paralleling the efforts to trace foods through the growth period to the ultimate marketed product must be studies of a toxicological nature. These constitute the fourth stage of inquiry. It is extremely important that the best available testimony go into the record as to the dietetic effect on the consumer if there be even minute traces of the unwanted residues. It is not likely that our present knowledge of toxicology is going to be adequate to answer all of the pertinent questions.

At this point, there is the danger that the professional testimony—which must be limited to opinion in many cases—may be converted into partisan argument. It is to be hoped—by all who have the best interest of the food business at heart—that the professional witnesses and the attorneys will not intermingle statements of fact and opinion in such a way that the two become indistinguishable.

(*Turn to page* 189)



Seabrook Farms photo

THESE automatic chlorinators are used for pre-treating liquid wastes. After wastes have been screened, units introduce chlorine into them to promote oxidation and to prevent odor nuisances.

WASTE DISPOSAL

Lowest over-all costs are seen either in rigidly controlling waste going into sewers or in reduced use of water and its reclamation in order to discharge highest concentrations of suspended solids to treatment works designed to process the entire amount of garbage from food plants

W. J. O'CONNELL, JR. and KEITH A. FITCH
Respectively, Chemical Engineer and Food Technologist,
W. J. O'Connell & Associates, San Francisco

Yesterday, Mr. Average Food Processor had isolated land areas or unused stream diluting capacities, or capacity in municipal sewers available for use for disposal of his wastes.

But today the picture is different.

Population growth and industrial development have left few processors with isolated land areas, and the same trends have resulted in increased demands upon the waste dilution capacities of streams. Processors whose operations entail substantial amounts of wastes are rightly concerned about how the costs for pollution control that are looming are to be allocated.

No. 1 need is the realistic viewing of each situation in perspective and an approach on the basis of facts and figures. The procedure for developing such perspective will be essayed in this report.

Public demand for controlling pollution has increased. Unregulated use of air and water, formerly more or less taken for granted, are now subjects of real concern, and broad efforts have recently been initiated toward the

prevention of nuisance and conservation of resources. As a result, both industry and government will be facing reasonable and unreasonable demands, during the next decade, for treating sewage and waste. The costs go into millions.

Public Law 845, passed by Congress in 1948, directs the Federal Security Agency to participate in all interstate and most state planning of water pollution control programs.[1]

Coincidentally, the U. S. Corps of Engineers and the Coast Guard are increasingly vigilant against violators of provisions of the Rivers & Harbors Act and the Oil Pollution Act regulating the discharge of sewage and waste into rivers, harbors, oceans and large lakes.[2]

In the past several years, many state legislatures have made moves to change laws they deemed to be unsatisfactory in controlling water-polluting disposal of sewage and waste. And the public is supporting them.

Trends Toward Control

Where the spread of communicable diseases and irreparable damage of waters for human consumption are concerned, benefits obtained by treating sewage and wastes are not measurable in terms of dollars. Almost any cost is seen justified for steps that will prevent such developments as cholera epidemics or the consumption of radioactive residues. True, in this country, the spread of diseases by polluted waters has been almost controlled.

Most laws under which health agencies act were designed to eliminate delays that are inevitable in legal procedure, thus to insure prompt control of water-borne diseases—a fact that precludes consideration of economic factors. But, in addition to controlling diseases, health authorities now are moving toward new and broader programs to improve the environment via such control. Unfortunately, these authorities have carried over the philosophy of health laws to their plans for administering programs to improve the environment.

It would be wise for all food processors to act and cooperate so that requirements for controlling pollution may be set up on realistic bases. But it is important that efforts toward improving the environments be reasonable, only demonstrable needs be anticipated, and the control of pollution be attained at the lowest cost to communities and industries.

Waste Disposal Methods

Food plant wastes usually get some degree of treatment—either by the plant or municipality—prior to their final disposal. There may be: (1) Minimum treatment before emptying into a lake, river or tidal flow; (2) diluting, after sufficient primary and secondary treatment when discharge must be into an insufficient flow of water in a lake, river or harbor; (3) minimum treatment prior to spreading on well-isolated land, or lagooning[3]; and (4) removing a large amount of suspended solids and lowering the biochemical oxygen demand (B.O.D.) sufficiently prior to percolating and discharging on a limited amount of land.

The economics involved in any treatment for controlling pollution are becoming increasingly important. An analysis to determine a balance between needs and costs for controlling pollution from industrial wastes (significant only because of chemical factors) merits an appraisal different from that

What To Expect On the Anti-Pollution Front

Federal action on industrial stream pollution will be moving ahead this spring.

Reports from the Public Health Service's division of water pollution control on prominent examples of sewage and industrial waste pollution affecting interstate waters are in preparation. And food processing wastes are in this category.

These early reports will be the first assistance from the new federal agency created as a result of passage of a federal anti-water pollution law by the Republican 80th Congress. This agency got its first funds last summer—a total of $2,725,000 as the first bite of a five-year program for which Congress authorized appropriations totalling $31,000,000.

Congress authorized the voting of funds to Public Health Service up to $22,500,000 per year for loans to states and municipalities for the construction of treatment works. Grants to states and interstate pollution agencies will total $1,000,000 per year for studying industrial pollution problems. For administration of the program, grants will reach up to $2,000,000 per year.

Also included via the new law are funds for the General Services Administration. To states, municipalities and interstate agencies will go $1,000,000 per year for drawing up plans for remedial works; for administration, $500,000 per year; and for the construction of a water pollution laboratory at Cincinnati, $800,000 per year for five years.

States are using their federal money grants to step up their own anti-pollution programs. Last year, the grants ranged from $35,000 for New York to $8,758 for Nevada.

The yearly reports the Public Health Service expects to release this spring are parts of what will later become a comprehensive report on the stream pollution problem in all the major river basins of the country. The agency has already asked state pollution agencies to furnish data for reports to ten river basin headquarters of the division of water pollution control. These offices will in turn relay the area information to Washington for drawing up the master report. Slaughterhouses and other food processing plants are considered important contributors to stream pollution in each of the ten river basin areas.

Food-processing waste studies are up front among the projects to which states are devoting this money. Texas is spending $14,000 on methods of treating citrus waste, and Minnesota is devoting $8,500 to studies on treating beet sugar refinery waste.

Thus far, industry has heard very little about the effect of the federal government's plans to cooperate in developing water-pollution control programs. From here on, it's clear that conservationists, sportsmen, public health officials, and others, will make extensive use of the information being gathered by the Public Health Service to get more authority for the federal government to enforce stream pollution measures.

At this time, the water pollution law gives federal officials no powers of enforcement. But the power of publicity, and increased concern about pollution brought on by more need for use of water courses for waste disposal by industry, can mean only one thing: More pressure of public opinion, which in turn can be reflected in the amounts of money and kinds of new authority Congress may be asked to give Public Health Service to deal with the problems if the states fail to meet public demands.

which is given to needs and costs for insurance against the spread of diseases.

Where control of pollution is only a matter of using the water for agricultural, industrial or recreational purposes, cost of treatment can be reasonably weighed against benefits to be expected.[4]

How Costs Are Based

Construction and operating costs of such sewage and industrial waste treatment plants—whether built and operated by the municipality or industry—are based on three variables: (1) Degree of treatment required to permit disposal without creating a nuisance; (2) gallons of flow to be handled and variations in flow rates through the disposal plant; and (3) strengths and variations in the strength of sewage and wastes.

Generalizations on probable costs for pollution control may lead to fallacious conclusions. Unit costs for amortization and operation of sewerage works—where sewage and waste are collected and treated—vary widely. One dominant factor in determining such unit costs is the expense of constructing sewers leading to the treatment works and disposal area. Another is the degree of treatment required by authorities.

Each situation calls for separate consideration, regardless of whether it is processor or municipality that assumes responsibility for disposal. When generalizations on costs are attempted, the magnitude and range of unit costs are expressed in terms of: (1) Capital cost of the disposal works per million gallons per day, (2) capital cost of the treatment works per capita served, and (3) cost per million gallons treated for amortization of investment and operation over the estimated period of useful life of the plant.

Range of Treatment Costs

Capital costs of sewage treatment plants depend primarily upon volume and strength of flows. These costs may range from $60,000 to over $225,000 per mgd. They amount to capital costs of $5 to $25 per capita. Pro-rated amortization and operating costs for treatment of fruit or vegetable cannery wastes in a municipal works may vary from $15 to $160 per million gallons. Amortization of capital investment in the sewage disposal plant and costs of operation for domestic sewage treatment generally range from $4 to $35 per million gallons.

Approximately the same costs apply to wastes disposed in a municipal sewerage works or by facilities provided by the industry, since the disposal methods are the same.

Major variations in treatment costs are attributed to differences in government viewpoints. Controversial questions include: (1) "What capacity should be provided to handle industrial waste at municipal works—considering the unreliable nature of estimates of industrial needs?" And (2) "What are the needs for supervision and operation of the disposal plants?"

When construction is financed through public vote on a bond issue, governmental officials (for political reasons) seek authorization for construction necessary for 20 to 30 years. It is unreasonable to expect them to propose construction on a step-by-step as-needed basis, unless they have vigorous support for advocating such programs. Frankly, they do not wish to accept the industrialists' approach, that is based on saving costs by building facilities with short useful life and then replacing them when necessary.

Principal cost in the disposal of food waste stems from the treatment of inedible portions of the raw material being processed. In fruit and vegetable canneries, the inedible wastes consist principally of peels, pits, cores, seeds and trimmings.

The manner of disposing of the inedible portions as garbage should be chosen after comparing costs of two methods: (1) Disposal of *all* garbage (including solids suspended in the liquid waste) directly from the plant to land or to recovery of by-products, and (2) dumping some of the garbage and disposing of remainder as suspended solids in waste flows discharged through sewers to ultimate disposal on land or into waters.

Disposal, either of waste solids directly from food plant onto land or recovery of by-products, is subject to cost control by the industry. Actually, few canneries are located where liquid wastes, still to be disposed of, may be spread on fields or diluted into streams after minimum treatment. Where varying amounts of garbage, as well as liquid wastes, must be discharged into sewers of the municipal treatment works, the costs are largely determined from capital expenses resulting from construction of facilities designed according to capacity criteria selected by the city engineer.

The manner of selecting design criteria for sewer and treatment facilities has a major effect on construction costs. In general, industrialists are anxious to have sewers "big enough". In addition, city engineers will make enough allowances for handling storm flows, expansion of city boundaries, and increases in population.

Cooperating With Community

From a tax and operating-cost standpoint, the industry must see that pollution control requirements are

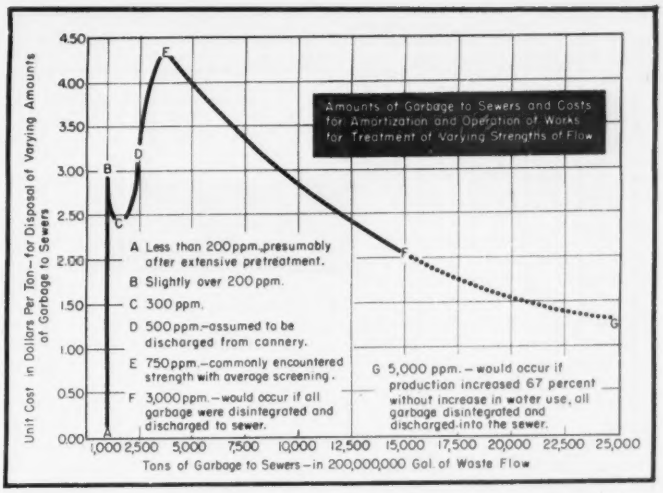

Amounts of Garbage to Sewers and Costs for Amortization and Operation of Works for Treatment of Varying Strengths of Flow
Unit Cost in Dollars Per Ton—for Disposal of Varying Amounts of Garbage to Sewers
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
A Less than 200 ppm.—presumably after extensive pretreatment.
B Slightly over 200 ppm.
C 300 ppm.
D 500 ppm.—assumed to be discharged from cannery.
E 750 ppm.—commonly encountered strength with average screening.
F 3,000 ppm.—would occur if all garbage were disintegrated and discharged to sewer.
G 5,000 ppm.—would occur if production increased 67 percent without increase in water use, all garbage disintegrated and discharged into the sewer.
1,000 2,500 5,000 7,500 10,000 12,500 15,000 17,500 20,000 22,500 25,000
Tons of Garbage to Sewers—in 200,000,000 Gal. of Waste Flow

FIG. 1. COSTS to municipalities for each ton of cannery garbage disposed into sewers are shown on basis of probable amortization and operation costs (set up in Table II). Variations in costs are controlled by amounts of peels, cores, culls, and other inedible materials going into sewers. Thus, when suspended solids are kept below 200 ppm. (less than 1,000 tons of garbage in a 200,000,000-gal. flow), garbage can be discharged into municipal sewage at negligible additional cost (Point A). If all garbage is discharged to the sewers but production is increased 67 percent (25,000 tons of garbage into a 200,000,000-gal. flow), unit disposal cost is about $1.30 per ton (Point G). This cost is comparable to those for disposing of garbage by hauling and dumping it onto land—a cost which is assumed to be $1.25 per ton.

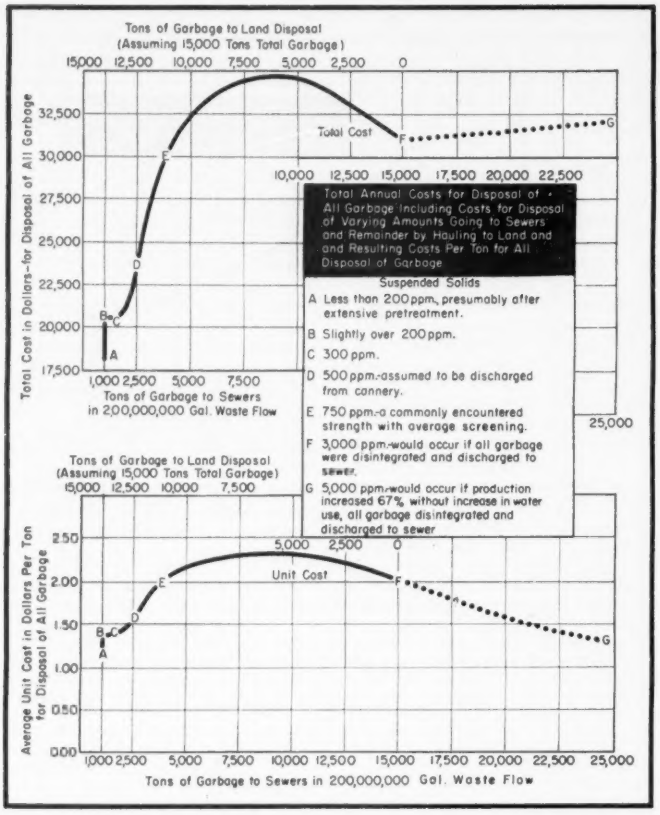

Tons of Garbage to Land Disposal
(Assuming 15,000 Tons Total Garbage)
15,000 12,500 10,000 7,500 5,000 2,500 0
Total Cost in Dollars—for Disposal of All Garbage
32,500
30,000
27,500
25,000
22,500
20,000
17,500
Total Cost
10,000 12,500 15,000 17,500 20,000 22,500
Total Annual Costs for Disposal of All Garbage Including Costs for Disposal of Varying Amounts Going to Sewers and Remainder by Hauling to Land and and Resulting Costs Per Ton for All Disposal of Garbage
Suspended Solids
A Less than 200 ppm., presumably after extensive pretreatment.
B Slightly over 200 ppm.
C 300 ppm.
D 500 ppm.-assumed to be discharged from cannery.
E 750 ppm.-a commonly encountered strength with average screening.
F 3,000 ppm.-would occur if all garbage were disintegrated and discharged to sewer.
G 5,000 ppm.-would occur if production increased 67% without increase in water use, all garbage disintegrated and discharged to sewer
1,000 2,500 5,000 7,500
Tons of Garbage to Sewers in 200,000,000 Gal. Waste Flow
25,000
Tons of Garbage to Land Disposal
(Assuming 15,000 Tons Total Garbage)
15,000 12,500 10,000 7,500 5,000 2,500 0
Average Unit Cost in Dollars Per Ton for Disposal of All Garbage
2.50
2.00
1.50
1.00
0.50
0.00
Unit Cost
1,000 2,500 5,000 7,500 10,000 12,500 15,000 17,500 20,000 22,500 25,000
Tons of Garbage to Sewers in 200,000,000 Gal. Waste Flow

FIG. 2. LOWEST TOTAL (and per ton) costs for disposing cannery garbage into sewers or dumping it onto land are obtained either by keeping suspended solids in the waste below 200 ppm. or reducing volume of flow over 40 percent and discharging all garbage into sewers. A 200-ppm. suspended-solids content is equivalent to discharging less than 1,000 tons of inedible material into sewers. And a 40 percent reduction in flow is the same as disposing liquid waste with 5,000 ppm. of suspended solids—our hypothetical cannery's 15,000 tons of garbage per season. In graphs, values from Table II were used, with an assumed cost of $1.25 per ton for hauling and dumping on land.

met with use of minimum facilities. To do this, informed representatives of industry should cooperate and provide engineering assistance to the community. With this cooperation, it will be possible to:

A. Establish agreements with regulatory authorities on minimum amount of treatment needed for reasonable pollution control under specific geographic and economic situations.

B. Preclude use of casually assembled data and estimates when selecting design criteria and planning operating program for proposed treatment works.

C. Make sure that design criteria for minimum treatment are selected with full knowledge of probable trends toward water economy in canneries and by-product recovery from cannery wastes.

D. Guard against a plant design affording unnecessarily large capacity for years to come—that is, the kind of plant intended for future populations or industries, that will not carry their share of the costs.

Any proposed project must be analyzed and, from the viewpoint of the industry, justified. It must assure lowest costs for the treatments required. Any premature agreement with promotional and political efforts "to get rid of the pollution" can result in assessment against the industry of major shares for amortization of large governmental expenditures.

The industry should aid the municipality or district in analyzing the engineering and economic aspects of sewerage proposals—while the community's engineers are preparing their report, not after the report is formally presented. In general, the importance of this matter of timing is not appreciated by industrialists. Too often they hold to the "let's see what happens" philosophy.

Cost Comparison Factors

An industry usually has a choice to urge one of four methods of disposing of waste: It can: (1) Agree to handle all its own disposal problems, (2) recommend a separate industrial waste treatment works be built and operated by the community along with the domestic sewage treatment works, (3) recommend that industrial waste and domestic sewage be treated in a single plant, and (4) the industrial waste can be pretreated in units in each plant and the effluent handled along with domestic sewage. (Analysis of the latter method, in an assumed case, is made later in this article in order to detail the various factors and variables.)

Under these four options, there are alternate choices for action, and the nature of costs involved can be shown. First, there may be consideration of the probable costs which will accrue to the community if a minimum, average, or all of the garbage from a fruit and vegetable cannery is discharged into the waste feeding into a municipal system for final disposal along with the community's domestic sewage. Second, consideration may be given the equipment necessary for pretreatment at the cannery to keep a minimum of garbage and liquid wastes from going into sewers.

Analysis of a Cannery Waste Problem

Now to get more specific: Table I shows the results of an analysis of an assumed situation—disposal of water and waste from a fruit and vegetable cannery that is the only such plant in a community with a population of 50,000.

A look at the hypothetical list of products packed will serve to indicate the nature of the operation. The following factors are given: (1) Water used in a 155-day season amounts to 200,000,000 gal., (2) average daily use of water is 1,330,000 gal., and (3) average waste liquid contains 500 ppm. of suspended solids with an 800-ppm. B.O.D. From this table it can be determined that the average rate of water use by our case-study plant during the tomato season would approach 3,840,000 gal. per 24-hr. day.

It is further assumed that this community has an average, combined high-strength flow of 5,000,000-gal.-per-day of sewage and wastes from other industries. Reference to standard textbooks on sewage treatment justifies the assumption that the municipal waste flow, apart from cannery waste, contains 325 ppm. of suspended solids with a B.O.D. of 350 ppm. In particular,

these assumptions are supported by reference to Table II.[5]

The sewers into which this cannery discharges its waste were built to handle wet weather increases of flow. However, such flows do not occur during the canning season.

If the waste from this cannery contained less than 200 instead of 500 ppm. of suspended solids, it can be figured that it could be handled by the municipality. Additional cost of handling would not be appreciable, since there are adequate provisions for treating domestic sewage throughout the year. The momentarily unused treatment capacity, otherwise needed for handling wet weather flows, would be available.

Cannery garbage from this plant, other than an irreducible minimum of solids suspended in the waste flow, can be dumped on land. The cannery also has drying and by-product-recovery equipment.

Because cannery waste treatment is seasonal, average annual capital costs for such treatment should be charged off over the operating season, or about half the year.

With any waste disposal problem, analysis of the economics requires a measure of the "loadings" to be handled. The magnitude of the waste loaded on sewers, treatment works, land or diluting waters is dependent upon three factors—number of gallons, suspended solids that settle under quiescent conditions, and the oxygen needed for biochemical stabilization of organic matter.

In our example, it can also be assumed that the area has large streams with a dissolved oxygen content greater than 6 ppm. And both municipal sewage and cannery waste can be diluted into them.

Often it is important to consider loadings in terms of B.O.D. and to select design criteria on B.O.D. comparisons. However, under the conditions in question here, operating difficulties and need for sufficient capacity to treat seasonal cannery wastes justify consideration of loadings in terms of suspended solids content.

Additional costs required for treating this cannery's wastes are attributed to difficulties in the settling of its waste solids in conventional primary tanks. Because of the nature of these solids, chemicals must be added to adjust the pH and to form a settleable floc. Failure to remove these settleable solids adequately will result in unsightly offshore conditions and ultimate formation of offensive sludge banks.[6, 7]

The general level of costs pro-rated for amortization and operation of facilities for treating cannery waste varies widely with the strength of the waste, measured by the suspended solids content. From experience and reference to data from a number of sources, assumptions for the cost per million gallons of flow are given in Table II. In addition, these costs show seasonal totals and unit costs per ton of garbage discharged into sewers. Values applicable to specific conditions of cannery operation, selected for analytical use, are underlined in this table.

Working Out Low Cost Disposal

From this table, it is evident that discharge of an adequately screened flow (which amounts to 2,500 tons of garbage disposed by this cannery into sewers) results in a unit cost of $3.20 per ton. This cost applies to one-sixth of the cannery's total garbage tonnage.

Significance in relationships between the amount of garbage discharged into sewers and the unit cost per ton of garbage so disposed can be seen when figures in this table are graphed (Fig. 1). The decrease in unit cost between discharges of 1,000 to 2,500 tons of garbage into the sewers—see (C) in Fig. 1—is a mathematical matter which is a function of cost assumptions set forth in Table II.

The significance of the lower unit

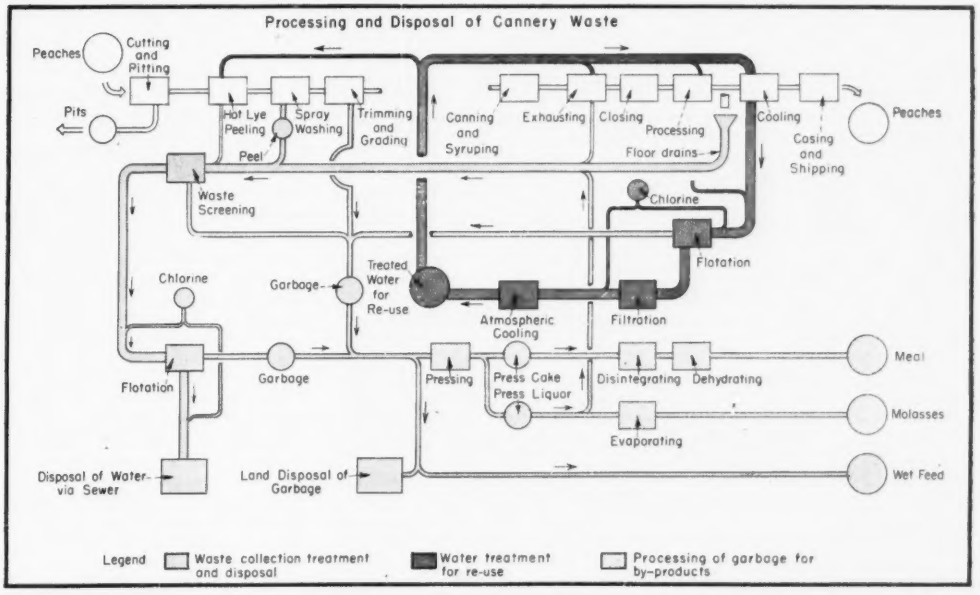


FIG. 3. EFFICIENT screening, flotation and chlorination will insure a cannery-waste flow with less than 200 ppm. of suspended solids. Waste so treated can be handled in municipal works along with domestic sewage at a slight additional cost. Waste water—primarily that used for cooling canned foods—can be re-used for certain operations after flotation, chlorination and cooling treatments. It may even be economical to install byproducts recovery facilities to recover dry feed or molasses from garbage screened and floated from waste flows and garbage from trimming tables. Also, by reducing volume of waste water so that all garbage can be discharged into sewers at lowest unit cost, it may be found economical to install facilities for the reclamation of water.

Here Are Data on Treatment Costs, Water Usage and Waste Flows

TABLE I—ASSUMED OPERATIONS Used as a Basis for the Analysis of a Typical Cannery's Waste Disposal Problem

Product	Raw Tonnage Processed per Hr.	No. of 16-Hr. Canning Days	24/2½-Case Production During Season	Raw Tonnage During Season	Gal. of Water Per Raw Ton	Total Gal. of Water During Season	Total Tonnage of Garbage* to Processing, Land Disposal, and Discharged in Waste Flow	Tonnage of Garbage Discharged in Typical Waste Flow	Biochemical Oxygen Demand (B.O.D.) Concentration of Waste Flow (ppm.)	Suspended Solids Concentration of Waste Flow (ppm.)
Peaches	25	40	687,500	16,000	2,400	38,400,000	3,500	750	1,500	700
Apricots	25	25	550,000	10,000	2,400	24,000,000	900	200	300	300
Asparagus	10	25	192,000	4,000	6,500	26,000,000	2,600	30	75	35
Pears	20	10	121,500	3,200	1,500	4,800,000	1,500	150	1,600	1,040
Spinach	10	20	128,000	3,200	7,500	24,000,000	1,120	130	800	180
Tomatoes	40	35	785,000	22,400	4,000	89,600,000	5,200	1,350	600	450
Total	..	155	2,464,000	58,800	.....	206,000,000	14,820	2,610	.....	.....
Average	..	..	.....	.....	.....	.....	.....	.....	815	450
Assumptions for Analysis of Problem	..	..	.....	58,800	.....	200,000,000	15,000	2,500	800	500

*Does not include pits.

TABLE II—ASSUMPTIONS OF COSTS to the Municipality for Treating Cannery Waste Flows of Varying Suspended Solids Content

Cost for treatment, in terms of dollars per ton of garbage treated, varies widely with changes in strength of flow. This is true regardless of whether the strength is measured in terms of B.O.D. or suspended solids. Fig. 1 of this report carefully analyzes "unit costs vs. tons of garbage handled."

Seasonal Average of Strength of Waste Flows as PPM. of Suspended Solids	Estimated Averaged Additional Costs for Treatment of Cannery Waste Flow, In Dollars Per Million Gal.	Total Cost for Treatment of Cannery Waste Flow, On Basis of Seasonal Water Usage of 200,000,000 Gal.	Tons of Wet Garbage (Excluding Pits) In Seasonal Flow	Estimated Unit Costs Per Ton for Disposal of Garbage in 200,000,000 Gal. Flow Based on Treatment Costs
Up to 200	No added cost	.....	Up to 1,000	$0.00
200	$15	$3,000	1,000	$3.00
300	$18	$3,600	1,500	$2.40
500*	$40	$8,000	2,500	$3.20
750	$80	$16,000	3,750	$4.26
1,000	$100	$20,000	5,000	$4.00
1,500	$125	$25,000	7,500	$3.33
2,000	$141	$28,200	10,000	$2.82
2,500	$150	$30,000	12,500	$2.40
3,000	$155	$31,000	15,000	$2.06
5,000	$160	$32,000	25,000	$1.28

*Strength of flow assumed for illustrative analysis.

costs with suspended solids contents above 750 ppm. is worth emphasis. Note that at a strength of 750 ppm. of suspended solids, a discharge of 200,000,000 gal. of water per season carries 3,750 tons of garbage into sewers at a unit cost of $4.25 per ton. On the other hand, if all 15,000 tons of garbage from this cannery were disintegrated and discharged into sewers, the unit cost for disposal could be reduced to $2.06 per ton—see (F) in Fig. 1.

It is particularly noteworthy that an even lower unit cost—$1.30 per ton—might be obtained if production is increased so that the waste contains 25,000 tons of garbage and no additional water—note (G), Fig. 1. Similarly, this low unit cost would prevail if production remained at the 15,000-ton garbage level, and the amount of water was cut 40 percent.

These varying unit costs per ton of garbage disposed into sewers should be compared with an assumed trucking and dumping charge of $1.25 per ton of garbage.

Fig. 2 shows the total over-all seasonal costs for all garbage disposal and over-all unit costs. These costs comprise two increments. One is for disposing of any portion of the garbage into sewers. The other is for disposing onto land or processing the garbage as it is collected in the plant.

Total cost for disposal of this cannery's garbage—(A), Fig. 2, top—is lowest when a minimum of suspended solids—less than 200 ppm.—reaches the sewer. When 3,750 tons (750 ppm. of suspended solids) are disposed of, the costs—(E), Fig. 2, top—indicate that a seasonal saving of about $12,500 may be attained by maintaining a minimum amount of suspended solids.

Disposal on Land Runs Lowest

The disintegration and disposal of the cannery's entire 15,000 tons of garbage into the sewers results in a total cost of $31,000—(F), Fig. 2, top. This is $13,500 more than when 14,000 tons of garbage are hauled, at $1.25 per ton, for disposal on land or processed by the canner. However, if production in the plant were increased, then disposal of 25,000 tons of garbage into the sewers (in a 200,000,000-gal. flow) would cost $32,000, against an assumed cost of $30,000 for hauling and dumping on land.

Rather than raising production, without using more water, economies can be obtained by continuing at the same production level, but cutting the amount of water used by 40 percent. This would result in a waste flow of 120,000,000 gal. per season, with a suspended solids content of 5,000 ppm. Assumed treatment-costs on a unit basis for this strength (Table II) are $160 per million gallons, making the seasonal cost for sewerage $19,200.

Since a comparison of the economies of waste disposal is most often made on the basis of cost per ton, total disposal costs (Fig. 2, top) are translated to per ton costs (Fig. 2, bottom).

Under the assumed conditions and requirements for waste treatment, the economical choice is either to dispose of a minimum amount of garbage into sewers with the balance dumped on land, or to reduce the amount of water and then disintegrate and discharge all of the garbage into the sewer.

Costs in this cannery analysis show the savings in over-all expenses which can be obtained by keeping wastes out of the sewers.

It may be difficult and costly to incorporate waste processing and water-recovery operations into a cannery. To determine whether this is practical and what costs are involved is the next step in this analysis. This calls for a waste processing and water recovery works flowsheet.

The same steps are taken toward establishing comparable unit costs for pretreatment at the cannery.

An idea of what equipment may be required is shown in the flowsheet (Fig. 3), which shows the equipment that will produce the desired effluent. It also shows facilities for water reclamation. No consideration is made where the effluent specifications require biological oxidation. Usual space limitations in or near a cannery, located in a community with a population of 50,000, make construction of secondary treatment units improbable.

Installation of the best equipment is necessary to insure the degree of pretreatment upon which this analysis is predicated. There is considerable difference in the performance of screening, chlorinating, flotating, pressing and drying units. Satisfactory equipment is described in the manufacturers' catalogs.[8]

The waste treatment elements depicted in the flowsheet are considered essential, regardless of the economics of water recovery. After effective screening, chlorine could be introduced into the waste flow to provide some oxidation and to prevent odor nuisances. The flow could then be treated in a flota-

tion unit. In this unit, flotation of suspended solids is accomplished with air (dissolved in the waste liquid under pressure), together with chemical flocculation aids. These units will reduce the suspended solids content of the waste water and give an effluent with less than 150 ppm. of suspended solids. Such an effluent would be satisfactory for final disposal by dilution or percolation without further treatment. This is true if the waste is prechlorinated to reduce the B.O.D. content and to deter the formation of H_2S in sewers following admixture with other wastes.

A suitable combination of chlorination and flotation equipment for waste treatment might cost about $25,000 installed. Annual charges for such installations can be estimated by allowing 12½ percent for interest, depreciation and maintenance. In this case, this increment of charge is $3,125, to which is added a $1,800 operating expense. This amounts to an estimated annual cost of $5,000 for waste pretreatment facilities and operation.

Comparison of resulting total costs for disposal of all garbage, including that into sewers, then gives us a figure of $23,650, if 2,500 of the 15,000 tons are discharged into the sewer—against $23,500 ($17,500 plus $5,000) if seasonal discharge into the sewer is controlled to 1,000 tons. Here, the reader may compare (D) and (A) of Fig. 2, top.

Drying the Waste

If the garbage cannot be dumped, a choice remains between discharging all garbage into sewers and providing facilities for reclaiming waste water or keeping the garbage out of the sewers and dehydrating and selling the meal.

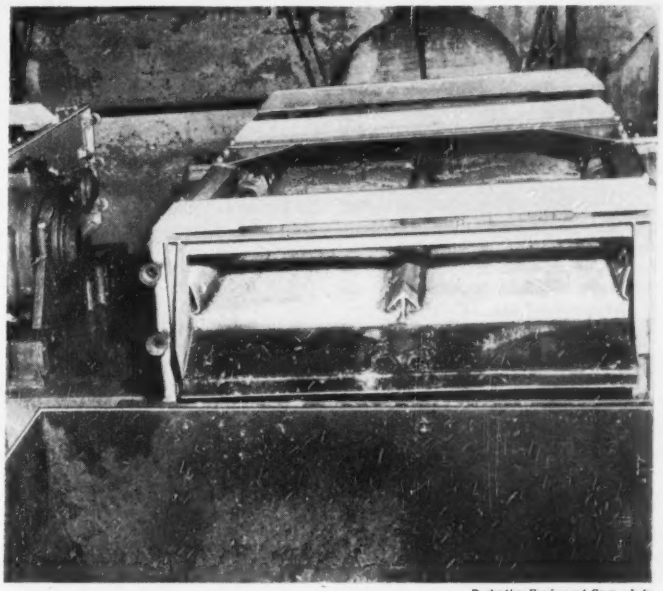
To dehydrate garbage and thus make meal, it is necessary to employ pressing, disintegrating and drying equipment. Suitable units might cost $40,000. Interest, depreciation, maintenance and operating charges for this equipment are to be compared with the $31,000 seasonal cost for handling garbage disposal to sewers.

In treating and disposing of press liquid from pear waste, evaporation may be used, depending upon whether it is profitable to convert this waste into molasses.

Where water conservation is desirable, facilities could be provided for reclaiming the cooling waters and possibly other water low in pollution. A recommended process for making re-usable water is to: (1) Segregate the waste streams, (2) subject re-usable flows to high chlorination, (3) use the flotation system, (4) employ pressure filtration, (5) rechlorinate to a low chlorine residue, and (6) cool in an atmospheric tower.

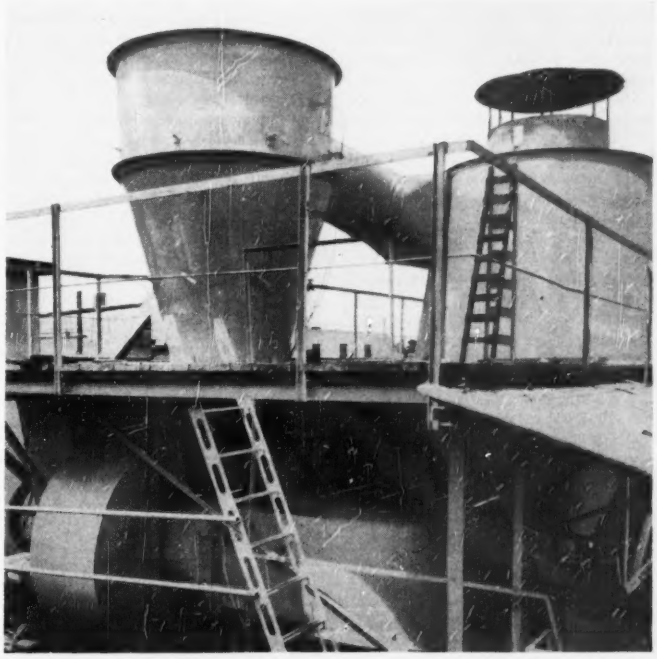
Re-use of the water should reduce

Solids removed . . . or dehydrated



Protective Equipment Corp. photo

MULTI-UNIT VIBRATING SCREENS remove solids from wastes and facilitate treatment of liquids in disposal lagoons, by natural purification in streams, or in the municipal treatment works.



DRYERS can be installed to dispose of wastes. With addition of pressing and disintegrating units, garbage can be dried into a meal, instead of being dumped on land or discharged into sewers.

assumed costs for disposal to the sewers of 15,000 tons of garbage from $31,000 to $19,200. An analysis of waste-water recovery economies shows that if 40 percent, or 80,000,000 gal., of water is reclaimed for annual costs of less than $10,000 (i.e., for unit costs of less than 12c. per 1,000 gal.), the total disposal and water treatment costs might be $29,200. The estimated annual cost of $10,000 for water recovery is thus covered, and the savings on water pumping or purchases are gains.

Water re-use must be carefully controlled, with due attention to the limitations, nature of the cautions, and the statements of principles set forth in the report of the National Canners Assn. Western Branch Laboratories.[9]

Wise Planning

Food processors should give detailed attention to future planning. Whenever any changes are made in plant layout, they should be made to assure lowest cost for facilities to process wastes and for obtaining waste disposal services from the community.

Units shown on the flowsheet for waste processing serve either for an isolated cannery or one centrally located. In either case, their use results in lowest operating costs—whether for handling industrial waste through the municipal sewers along with domestic sewage, or separately processing the wastes of a number of plants. The effluent could be disposed of either on land or into commonly available volumes of diluting waters, without nuisance or damage.

In using this analysis, it is not intended that municipal officials assume that industry should pay all construction and operating costs. This does not follow, since it is common practice for the community to provide centrally located separate facilities to treat all industrial wastes for final disposal so that the effluents similarly contain less than 200 ppm. of suspended solids. The decision to provide separate, but common, industrial waste treatment facilities for a number of plants, is always based upon the policy of lowest over-all costs to the interest of the community. Then, if lowest cost for sewage and waste disposal can be obtained by providing for treatment of fruit and vegetable processing waste, as in this case, such a unit—even though located at the cannery rather than at a central site—can also be considered a part of the community system.

To protect his economic interest, each processor, in an area where pollution control programs are proposed, should seek the advice of experienced industrial consultants. They can assure him that the design bases demanded by authorities and selected by a municipality's engineer are analyzed from the industries' viewpoint. In this manner, it can be determined whether adequate alternatives would result in overall reductions in financing, construction and operating costs.

Public Law 845 purports to "recognize, preserve and protect the primary responsibilities and rights of the states in controlling water pollution." But, supporters of both the Public Health Service and the Army Engineers, through such bills as H.R. 4568 and H.R. 4825, are continuing their efforts to gain full authority for pollution control throughout the nation. Concentration of control at this level could result in application of standards without regard to local situations, assessment of unreasonable taxes, and unjustified increases in production costs. To forestall such developments, the citizens must themselves take the action necessary to correct currently unsatisfactory situations.

Pressure will be exerted for the industry to bear a significant share of sewage and waste treatment costs through taxation, sewer rental charges, or requirements that they make their own capital investment in treatment works. In most cases, lowest over-all costs for disposal of industrial waste will follow from providing separate waste-treatment works for groups of processing plants, or from control at the discharge origin of settleable, putreseible or toxic wastes into sewers. Contributing to the same end, are reduction in the use of water and in-plant reclamation of water for procuring high suspended solids in the waste.

Fundamentally, the problem of the processor is to avoid using large amounts of water for washing and cooling and to dispose of garbage.

In general, the industry has already assumed responsibility for the cost of disposing of 75 to 85 percent of its garbage. Thus, there is sound reason to contend that any community should assume costs for handling at least 7 percent of the industry's garbage. Matters of capacity needed in a municipal works, and sewer rental charges, often may be based on handling 10 to 20 percent of the garbage created in a season. This garbage could be kept out of sewers with pretreatment facilities at the cannery as part of the municipal sewerage system.

The industry must make it known that garbage-disposal costs are vital when deducted from the small profit margin on most processed foods.[10] This is true whether the disposal is done by the processor, municipality, or both.

Industry should point out that peak fruit and vegetable waste loads occur, at the most, a few hundred hours a year. Then, consideration should be made to use works designs that provide for less than otherwise-desirable removals when handling overloads.

When nominal capacities are exceeded, additional treatment may be obtained through periodic use of chemicals, chlorination for oxidation, and use of ferric sulphate for coagulation so that capital costs for construction are reduced. Such planning will, of course, result in occasional increases of operating charges, but those charges may be much less in the aggregate than continuing tax burdens for amortizing costs of facilities handling low loads.

The processor should be informed on trends regarding percentages of costs for sewerage service to be paid from general tax revenue, as distinguished from "sewer rental" revenue.

Especially in situations where there can be any questions regarding the future of industry in the area, food processors and other industrialists should campaign for municipal construction of minimum-sized works.

References

1. Public Law 845, Chapter 758 (S. 418). To Provide for Water Pollution Control Activities In the Public Health Service of the Federal Security Agency and In the Federal Works Agency, and for Other Purposes. 80th Congress, 2nd Session.
2. Oil and Refuse Pollution, Navigable Waters of the United States, California. Bulletin of Corps of Engineers, U. S. Army, South Pacific Div., Oakland Army Base, California, 1949.
3. L. F. Warrick, T. F. Wisniewski, and N. H. Sanborn, "Cannery Waste Disposal Lagoons", Bulletin No. 29L, National Canners Assn., Washington, 1945.
4. W. J. O'Connell, Jr., "Balancing Benefits and Costs for Controlling Pollution from Chemical Factors in Industrial Wastes." paper presented at 115th National Meeting of American Chemical Society, San Francisco, Mar. 29, 1949.
5. Willem Rudolfs, "Principles of Sewage Treatment." Bulletin 212, National Lime Assn., Washington, 1941.
6. A. J. Castro, "The Treatment of Cannery Wastes at Santa Clara, California," *California Sewage Works Journal*, 14, (2), 22-25, 1942.
7. F. J. Rossi, "Modesto Studies Its Industrial Waste Problem", *Western City*, 23-5, Feb. 1946.
8. Manufacturers' Catalogs: Selectro Vibrating Screens, Bulletin 448, Productive Equipment Corporation, Chicago . . . Visible Vacuum Chlorinator Type MSV-M, Pub. No. TP-15-C, Wallace & Tiernan Co., Newark, N. J. . . . Colloidair Separators, Tech. Pub. CS1, Bulkley, Dunton Pulp Co., Inc., Pasadena, Calif. . . . Continuous Type Dewatering Press, P & L Welding & Machine Works, Anaheim, Calif. . . . Vertical Hammer Mill, P & L Welding & Machine Works, Anaheim, Calif. . . . Drier Publication No. A-15B, P & L Welding & Machine Works, Anaheim, Calif.
9. Chas. T. Townsend and Ira L. Somers, "Important Considerations in the Re-Use of Water in Canneries." Research Laboratory Report No. 12758B, National Canners Assn., Western Branch Laboratories, San Francisco, 1948.
10. W. J. O'Connell & Associates, "Report on Problems of Disposal of Processing Waste and Presentation of Facts Relating to the California Fruit and Vegetable Canning Industry." Western Fruit and Vegetable Canners Assn., San Francisco, 1948.

The above report is based on a paper presented, at the 1949 Annual Meeting & Conference of the Institute of Food Technologists, as a service of the Western Manufacturers Bureau of Information on Industrial Water Supply & Waste Disposal.

SAMPLING of milk—first step in test—is performed by Dr. H. S. Bryan, assistant professor of veterinary pathology and hygiene, University of Illinois College of Veterinary Medicine. (Photo courtesy College of Veterinary Medicine)

Quick, Cheap Ring Test Spots Brucellosis-Infected Herds

Called "seven times faster at one-tenth the cost," new procedure is seen as boon to dairyman in curbing toll-taking Bang's disease

LYLE E. ASHELFORD

Assistant Editor, University of Illinois College of Veterinary Medicine

Dairy plant operators who have their eyes on the crystal ball see a big new part they may play in stimulating a greater wholesomeness of the nation's raw milk supply. For in one year—perhaps two—they may test milk for brucellosis (Bang's disease) just as they now test it for butterfat.

The "Ring Test" is the new development that many scientists predict will be a great aid in the control and even eradication of brucellosis—which robs the nation's dairy industry of more than $88,000,000 per year, and causes undulant fever in thousands of families who drink infected raw milk.

How Test Is Made

Operators will find the test easy to make. A small sample of milk is taken from each can of a producer's shipment. One drop of a specially prepared purple *Brucella* antigen is added to a small amount of this milk in a test tube. The mixture is thoroughly shaken and allowed to stand at room temperature until the cream rises.

At the end of an hour, samples are ready for reading. And here is how the test gets its name. If the cream layer forms in a blue ring around the top of the sample and the milk is white, then the test is positive. This means, the herd *may* have infected cows. If the cream is white and the milk blue, the herd is negative for brucellosis. The test, with but little change, can also be used for cream samples.

The test screens out those herds that have brucellosis. Once such herds are found, the owners can be encouraged to have their veterinarians check each cow for infection by means of blood tests. Infected cows would then be removed, leaving healthy herds.

Many milk plant operators will want to know what happens during the test. When an animal is infected with the bacteria of brucellosis, its body fights them in every way it can. One way is to produce special proteins, called antibodies, which make the bacteria clump together. These antibodies are present in the milk of infected cows, and the ring test is used to detect them.

Antibodies Responsible for Reaction

The antibodies are carried on the outside of the cream droplets. When the antigen, which is a suspension of killed Brucella bacteria stained blue, is added to the milk, the antibodies attach themselves to the bacteria and capture them. When the cream rises, the antibodies and bacteria go with it, and a blue ring is formed on top of the milk. If there are no antibodies present, the stained bacteria are left in the milk, and the cream remains white.

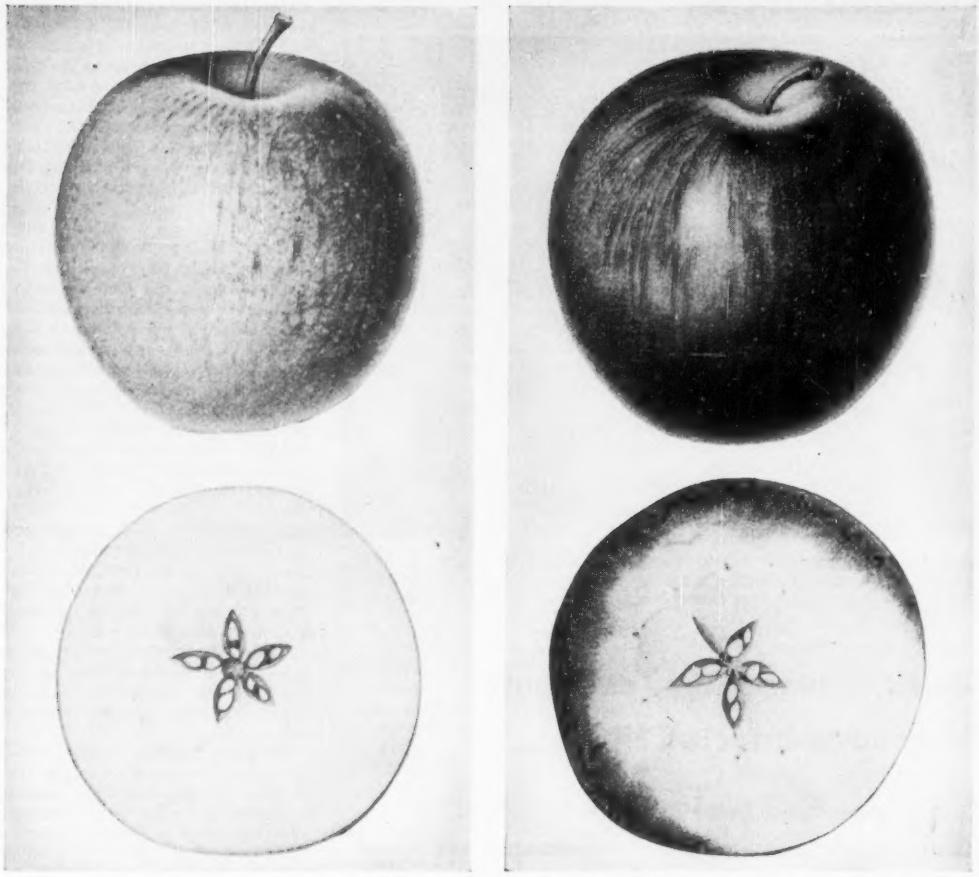
Advantages of the ring test over the now-used blood test are two-fold—economy and speed. It's believed that the ring test costs only about one-tenth as much to make as the blood test. And one man can test more than 50 herds a day. That's seven times as fast—since it would take the county veterinarian a week to test the same number of herds by use of the blood test.

But it may be more than a year before milk plant operators will be able to use the ring test. In research laboratories at the University of Minnesota, University of Illinois, Michigan State College, and probably in other states, scientists are busy checking its accuracy against the results of blood tests.

Pioneering, and leading the nation in experiments on the ring test, is the University of Minnesota. There, Dr. M. H. Roepke reports that the ring and blood tests have been compared on 7,022 herds.

Among the disadvantages of the ring test is that it won't find infected cows that are not in production. But, it would catch them on a second test after they refreshen. In Minnesota, the blood test found reactors in 112 herds which had been negative on the ring test. But in 41 of 73 herds checked, it was disclosed that the infected cows were out of production at the time of the tests.

Other disadvantages not yet resolved: It sometimes gives false positive readings; it misses infection in bulls or beef cattle; it is not accurate on frozen, sour or colostral milk; and it sometimes gives a false negative reading on milk of infected cows if the milk is too greatly diluted with milk from healthy cows.



FIGS. 1 & 2. THESE ARE Rome Beauty apples picked too early for satisfactory storage. Top left: Fruit had leaf-green area on shaded side of skin at time of picking, and (lower left) green color in flesh. Right: Apples of same lot after 6 months storage at 32 deg. F. Skins (top) had developed brown characteristics, and (below) cells immediately under skin, and in skin itself, were discolored, indicating that cells had ceased to function.

Stored Apples—Why They're

First step in assuring keeping quality is selection of fruit on the three-

LOU BISNO

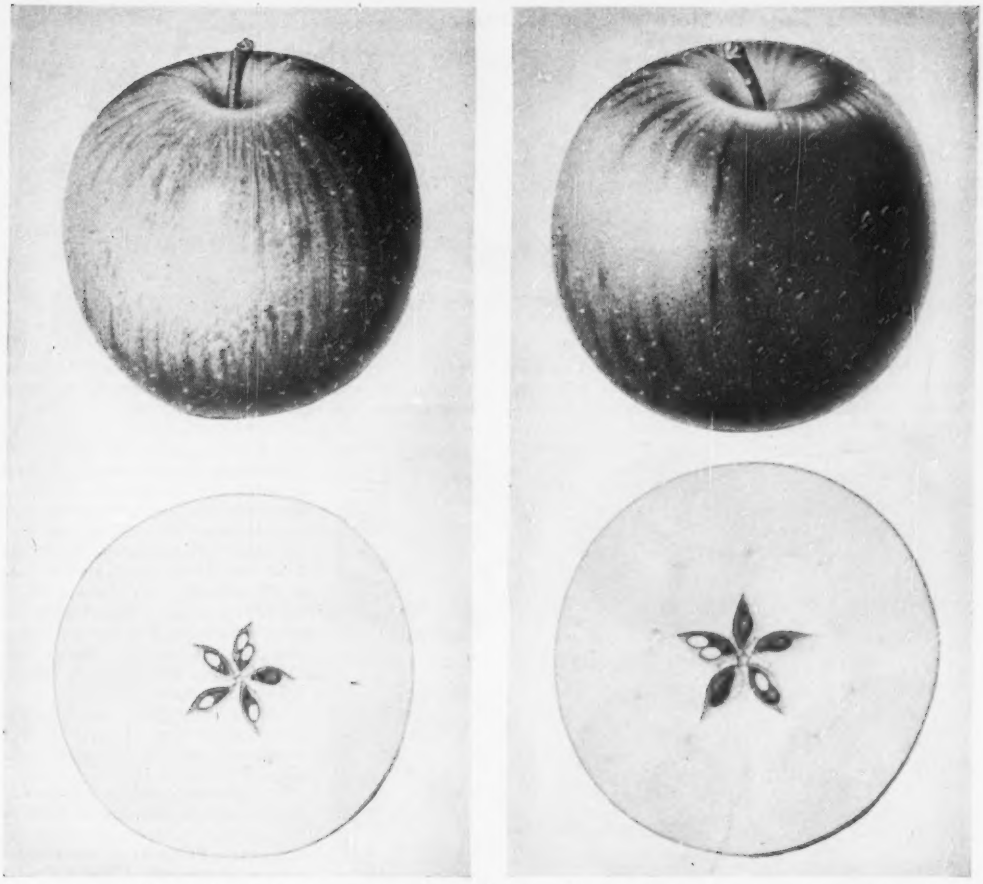
Bakery Chemist and Production Consultant, Burbank, Calif.

Part I

There is a diversity of opinion within the pie baking industry as to the economy of using fresh apples instead of canned ones, particularly at the end of the storage season.

The fact is that the high percentage of storage rots—they have ranged up to 44.6 percent in winter apples withdrawn from storage in July—represent serious factors in cost, production practices and plant sanitation. And the problem of rapid mold growth in apple pies under conditions of high temperature and humidity is of considerable consequence.

The object of this three-part article is to indicate a number of factors bearing upon apple storage losses and suggest some effective means for reducing them. The substantiating data are taken from personal experience supplemented by that from quoted sources. Three steps for deterring losses are distinguished—selection; picking, handling and temporary storage; and conditions of final storage—and will be the subjects of our three articles.



FIGS. 3 & 4. SAME VARIETY picked at proper maturity for extended storage. Top left: Skins were white and light yellow at time of picking. Cross section (lower left) showed no green in skin and flesh. Right: After 6 months storage at 32 deg. F., skins (top) had deep yellow in ground color. Cross section (lower right) showed an increase in yellow tint in flesh, characteristic of maturity. (Photos from USDA Bul. 587)

Lost and How They're Saved

point basis of suitable variety, proper maturity, and uniform grade

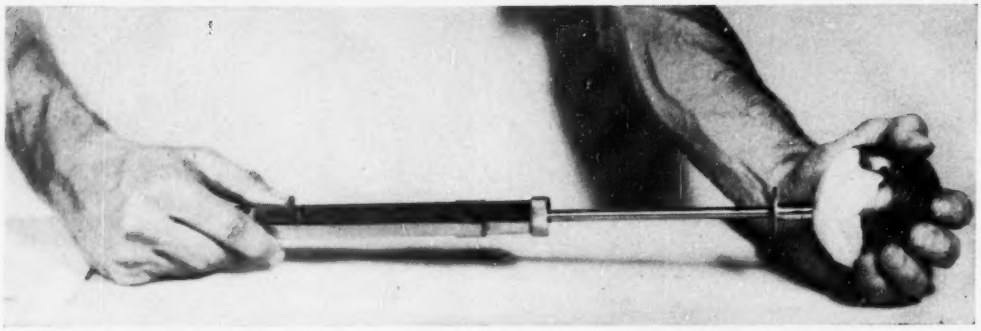
Since the greatest losses normally occur in the long-keeping varieties, special consideration is given to those fall and winter varieties generally used from January to August inclusive.

On the point of apple quality, pie bakers' requirements must be contrasted with those of the canners, who have a relatively short packing period during which the fruit must be held in storage. In the case of canners, slight defects involving skin perforation are of minor consideration. And opportunity for the development of rot is small in contrast with that in apples stored until late summer or early fall. Storage quality is essential in apples for year around use by pie bakers.

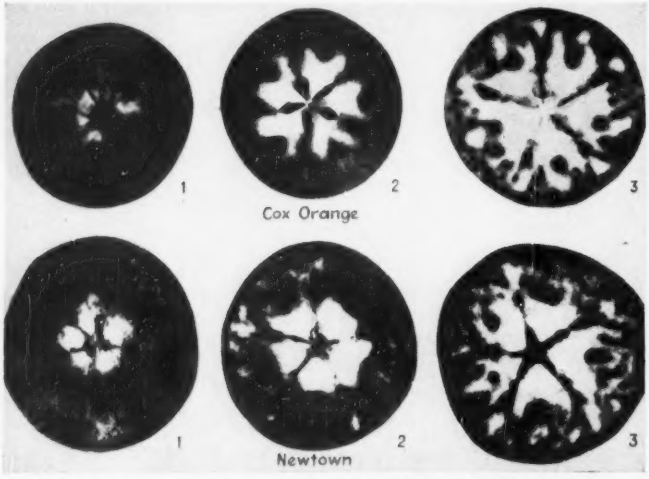
Although variety of the apple is the most important indicator of the storage quality, serious consideration must be given to orchard and growing conditions, degree of maturity, grade classification, presence and nature of defects and injuries, pre-storage handling, and storage conditions.

From the standpoint of the pie bakers in the New England and Middle Atlantic states, the Baldwin has been considered the most desirable of the long-keepers. But, because of the severity of frost-damage incurred in recent years, this variety is being suit-

Tests Indicate Time To Store and Time To Use



PRESSURE TEST which measures resistance to puncture. It is used to appraise potential keeping quality of apples when purchased, and to indicate proper time for withdrawal from storage. (D. Ballauf Mfg. Co. photo)



STARCH CONTENT, another test for maturity, is gaged by dipping slices in weak iodine solution. Center specimens (above) are at proper stage for long storage. (Dept. Agr. Expt. Sta., Summerland, B. C. photo)

ably replaced by others, such as the McIntosh, Cortland, Rome Beauty and Stark. Of these it is noted that only the last two are winter varieties.

The Rhode Island and Northwestern Greenings have fairly good keeping qualities and may be used between April and June, provided they are of good grade. The Stark stores excellently and keeps well into summer. The Willow-Twig is the favorite long-keeper in the Central States area, while the Newtown Pippin is used almost exclusively on the West Coast.

As examples of intermediate keepers —those for use between January 1 and April 1—we may include the Paragon (erroneously called Black Twig), Golden and Red Delicious, Grimes Golden, Northern Spy, Stayman Winesap, Winter Banana and York Imperial.

Since the U. S. apple standards for the higher grades presuppose a more careful selection than for the lower grades, it is highly desirable to store fruit belonging to the higher grades. Greater uniformity and firmness are more likely in the U. S. No. 1 than in the utility grade. Under the standards for the higher grades, apples are defined, in part, as being mature but not overripe. However, there is still the possibility of considerable variation as to firmness.

When bruised, wormy, scabby, moldy, or excessively soft apples are packed with sound fruit, the percentage of decay will be greater than if the mixed apples are separated into the higher grades with consideration for the degree of maturity, and into those showing the several classes of defects.

In a storage test, nine boxes of a lot of apples containing defective fruit were classified into three groups, and together with four boxes of the fruit as originally packed, these groups were checked after 3½ months of storage. Results (Table I) indicate that:

1. When defective apples of the types listed are stored together with those which are sound, the total amount of defective fruit is increased over that resulting when the apples are separated into the classifications noted—10.2 percent as compared with an average of 7.89 percent.

2. Wormy apples stored alone showed more than 30 times the percentage of rots that developed in the sound fruit.

3. In bruised, moldy and decayed fruit, more than 200 times as much rot developed as in the sound apples. In this group, furthermore, there was a substantial amount of mouse damage (entirely absent in the sound fruit).

This data and other data to be reported later, show that it is desirable to select sharply defined grades—making sure that those purchased fall within the grade claimed. As an example of variations in pack, a check made on the 1940 pack of seven commercial packers of Michigan apples*, showed many to be below the grade claimed. In this test (see Table II), three to four containers were checked in each case.

Should Be Mature When Stored

As a determining factor in the potential life of the stored apple, maturity ranks next to the essential characteristics of the variety. While, in general, we associate maturity with optimum eating quality, the term has a somewhat different connotation from the standpoint of long storage. For the purposes of this discussion, the condition termed "optimum maturity" by Haller, et al[4] is used as a basis. His statement follows:

"Apples picked at optimum maturity

can be stored with a minimum of storage disorders and ripened with maximum dessert quality for the variety and conditions of growth."

A number of factors have been studied as a means of estimating maturity. Among these are skin-color, seed color, starch content of flesh (iodine-test), flesh color, sugar and acid content, and flavor. While all of these are significant, there are practical difficulties in using them as criteria when each is used alone.

The pressure-tests, using the maturity-tester (see photo) combined with visual observations, give invaluable aid in estimating maturity. The maturity tester not only helps to appraise the potential keeping qualities of apples as purchased, but it also determines the softening rate in storage. The one shown is a spring-type hand device registering pressures up to 30 lb.

Here is how a test is made: First the apple is peeled very thinly at two or three points in the blushed and unblushed portions; second, the plunger of the tester is forced into the flesh at these points until the ring of the spindle, 5/16 in. from the end, coincides with the surface of the apple; and third, readings are taken (the average reading being used).

At times, in the application of the test, it is found that the resistance to the penetration of the plunger increases up to a point and then decreases sharply. In production practice, apples with these soft centers are thrown off the forks of apple-paring machines and have to be hand peeled. This reduces the productivity of the machines, and cuts down the yield of clean apple.

Tester Determines Softening Rate

Use of the pressure-tester enables the owner to determine, at the time of purchase or storage, undue variations in firmness, which affect the keeping qualities of the apples. This instrument has proved invaluable to the writer in selecting apples for storage and in deciding when stored apples should be withdrawn. If the apples are examined at the time of storage and at intervals of about two or three months thereafter, the rate of pressure drop is determined, and appropriate action may be taken.

Normally, a softening rate of about 1 lb. per month may be expected. In judging the time for withdrawal, the initial firmness, the rate of softening, the appearance of rots or scald, and the tendency to mealiness when ripe are considered. Flesh of the Rome Beauty, for instance, is essentially fine-grained. When full-ripe, these apples are susceptible to breakage on the paring machines. For this reason it is desirable to use them before the pressure test has dropped below 10 lb. Apples of most other varieties, however, may be handled satisfactorily at 8-lb. pressure or higher.

In the early varieties, the pressure at picking may fall into the same range as that of the late-keepers, the firmness at the ripe stage is less, however. This is shown in Table III[2] which contains data on 16 varieties of apples covering three seasons (1935 to 1937). Results of tests on three other varieties are given in Table IV.

Blushed apples, in the case of those varieties normally developing red in the skin, show higher sugar content, higher pressures, and better keeping

(*Turn to page* 187)

Many Pre-Storage Factors Contribute To Apple Keeping Quality

TABLE I—GRADING Prior To Storage Improves Keeping Quality of Apples

Group	Number of Boxes	Percentage by Weight of Total Nine Boxes	Condition of Apples When Graded	Rots After 3½ Mo. (Percent)	Comments
1	4	44.5	Sound	0.19	.....
2	4	42.5	Wormy	6.12	.....
3	1	13.0	Bruised, moldy or showing decay	40.00	Some mouse-eaten during storage
4	4	Ungraded; stored as packed	.....	10.20	Few mouse-eaten during storage
Average of Groups 1, 2, and 3	....	.....	.....	7.89	.....

TABLE II—CHECK SHOWS Many Apples Are Below Grade Claimed

Graded For—	Percentage Below Stated Grade		
	Minimum	Maximum	Average
Size	1	14	6
Color	0	9	6
Other defects	0	20	12
All defects at packing time	5	32	23
Bruises and skin breaks	4	58	18
Decay	0	3	1
Total post-grading defects*	4	59	19
Total off-grade*	27	56	42

* Additions are misleading, since some apples had more than one defect; also because fractions of a percent have not been accounted.

TABLE III—WHEN RIPE, Early Apples Are Less Firm Than Later Varieties

Apple Variety*	Pressure Test In Pounds (At Stages of Maturity as Noted)			
	Hard	Firm	Firm-Ripe	Ripe
Arkansas (Black Twig)	18.0–25.0	15.0–19.0	13.0–16.5	11.0–15.0
Ben Davis	17.5–24.0	14.5–18.0	12.0–15.0	8.0–13.5
Bonum	18.5–30.0	15.5–19.5	12.0–16.5	8.0–13.0
Delicious	16.5–20.0	14.0–17.5	11.0–15.0	8.0–12.0
Golden Delicious	16.0–20.0	13.0–16.5	11.0–14.0	8.0–11.5
Grimes Golden	18.0–27.0	15.0–18.5	12.5–16.0	9.0–13.5
Jonathan	16.0–21.0	13.5–16.5	10.5–14.0	8.0–12.0
Oldenburg	16.0–21.5	13.0–17.0	10.5–14.0	7.0–13.0
Rome Beauty	18.0–23.0	15.0–19.0	12.5–16.0	9.5–13.5
Stayman Winesap	15.5–21.0	13.5–16.5	11.0–14.0	7.0–12.0
Wealthy	16.0–20.0	13.0–17.0	10.0–14.0	6.0–11.0
Williams	16.0–26.0	12.0–17.0	10.0–13.0	6.0–12.0
Winesap	18.0–27.0	15.0–19.0	12.5–16.0	9.5–14.0

TABLE III—Continued.

Apple Variety*	Pressure Test in Pounds (At Stages of Maturity as Noted)			
	Hard	Firm	Firm-Ripe	Ripe
Yellow Newton	18.0–21.5	15.0–19.0	12.0–16.0	10.0–13.0
Yellow Transparent	16.0–22.0	13.0–17.0	10.0–14.0	6.0–11.0
York Imperial	18.0–24.0	16.0–19.0	14.0–17.0	9.0–15.0

* Data pertaining to Baldwin apples (not given here) may be found in a report by D. F. Fisher, U. S. Department of Agriculture (see Reference 1 at end of article).

TABLE IV—WHEN PICKED, Pressures Fall In Same Range Regardless of Apple Variety

Apple Variety	Pressure Test At Picking Time	
	1st Year Test	2nd Year Test
Grimes Golden	20.7 lb.	20.8 lb.
Baldwin	19.5 lb.	20.2 lb.
Ben Davis	20.8 lb.	20.5 lb.

TABLE V—SUGAR CONTENT of Apples Increases With Skin Color Development

Apple Variety	Skin Color	Sugar Content—Percent (Refractometer)
Stayman Winesap	Green	12.4
Stayman Winesap	Well colored	14.4
Golden Delicious	Green	11.1
Golden Delicious	Golden	13.6
York Imperial	Green	11.5
York Imperial	Well colored	13.7

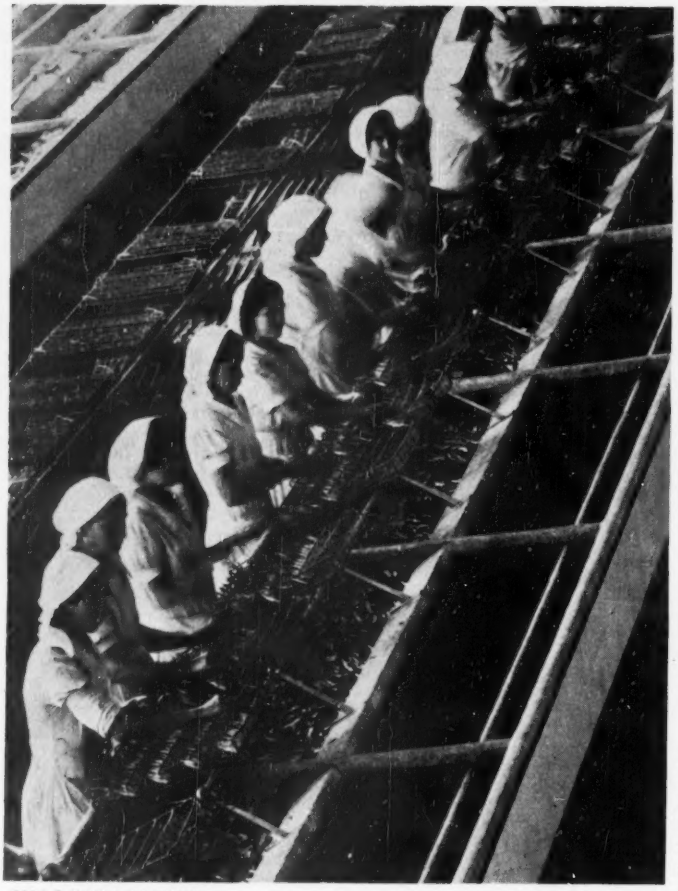
TABLE VI—RELATION of Apple Skin Color To Pressure Test

	Apples 2½ In. Dia.		Apples 2¾ In. Dia.	
	Green	Blushed	Green	Blushed
Average Pressure, lb.	13.29	15.09	12.85	14.07

TABLE VII—MATURITY At Time of Storage Governs Apple Storage Life

Defect	Time	Percent Spoilage	
		Mature Apples	Immature Apples
Bad Scald	At withdrawal from storage	3.5	58.9
Bad Scald	Ten days later	17.8	81.6
Decay	At withdrawal from storage	0.1	0.4
Decay	Ten days later	2.7	18.0

Eviscerating Table Speeds Old-Style Processing



GIRLS RACK SARDINES from brining trough into flakes for washing and processing. They arrived in now-empty trough, were beheaded, and tossed into brining trough. Waste is flumed away. Note flake conveyor (rear).

French Sardine Canners Keep Accent On Taste

Palate appeal remains the criterion as they turn to mechanical processing, new way of purifying oil for reuse, and improved cooking and handling methods

HENRI CHEFTEL, Director, Research Laboratory
Ets. Carnaud-Basse-Indre, Paris, France

The processor's troubles are the same in Europe: With labor costs increasing, and higher prices for oil, the West European and North African sardine industries have been looking for cheaper means of producing their canned sardines—means which will not alter their traditional high quality.

Their endeavor has been directed along three lines: 1. Replacement of the expensive frying process by other methods of cooking. 2. Improvements and modifications in frying, where this procedure is retained. 3. Better organization of manufacturing operations and mechanization of handling.

Off With Their Heads And Into the Can

In an attempt to combine Aims 1 and 3 above, experiments in packing raw sardines into cans and performing the necessary cooking and other treatments mechanically were started by the author some years ago. They were directed at eliminating the disadvantages of raw packing, while producing a pack equal in quality to that resulting from hand work and frying.

The main difficulties which had to be overcome were the sticking of the fish to the cans and to the perforated drain covers over them, the elimination of coagulated blood, and the removal of excess water (coming either from the fish or from condensed steam in the exhaust box).

These experiments resulted in a new machine which is being used successfully on the west coast of France and in Morocco. The apparatus is built in Belgium by International Machinery Corp., an associate of Food Machinery & Chemical Corp.

New features of the process are that, apart from eviscerating and packing into cans, all other operations including brining, are performed by the one piece of equipment. The steam exhaust box is provided with a heated double roof, eliminating any risk of condensed steam falling into the cans. The final product, if not equal to the highest grades of French sardines fried in oil, is nevertheless as good as the average French or Portuguese pack.

The apparatus, made entirely of stainless steel, has the following dimensions: Length, 13½ ft.; width, 8 ft.; and height, 10 ft. It has a capacity of about 50 "quarter oil" cans per min. Filled cans are fed into it in rows of 7 to 16, depending on their size, and no adjustment in the machine is necessary to run different size cans. Over each row of cans goes a perforated cover. The row is then attached to the slow moving chain of the apparatus.

Before the cans are put into the machine, they are sprayed with olive or peanut oil (to prevent sticking). Then the beheaded and eviscerated fish are packed into them, and they are half filled with brine. The machine takes over from there, and performs the following operations:

(1) Drains the first brine. (2) Fills the cans with fresh brine. (3) Gives the fish a preliminary cook (8-10 min.)

in steam. (4) Drains off the second brine. (5) Inverts the cans for cooking in hot (300-320 deg. F.) air. (6) Brings cans upright for further cooking. (7) Again drains cans, with slow vibration. (8) Gives a final cook, once more inverted. (9) Fills cans with oil (olive or peanut) or sauce. (10) Exhausts them. (11) Delivers them to the double seamer.

Total period in the hot-air oven (Steps 5, 6, 7, and 8) amounts to about 20 min., and the whole passage through the machine runs a little short of 1 hr. Speed of the conveyor chain may be varied in the ratio of 1:6. And the volume of brine or oil added to the cans may be controlled without stopping the machine. Temperature and speed of the air in the oven are automatically regulated, as well as the admission of steam into the cooker and exhaust box.

Further work is now underway to complete the line ahead of the cooker with a conveniently arranged packing table (already designed), an automatic cutting and gutting machine, and a size grader.

Flakes Are a Nuisance

The machine described above utilizes the method known as raw packing, and in so doing it eliminates the necessity for grills, thus avoiding damage to the fish.

Grills, with their trays and shelves, and the considerable labor necessary for filling, handling, emptying, cleaning and maintaining them, are the greatest nuisance in a sardine-canning factory. Flat grills, or flakes, as used in Maine canneries, are incompatible with the frailty of French sardines.

Although methods of cooking other than the one described above have been developed to replace the expensive frying process, grills are still used for handling. The procedure mainly used in Portugal, Spain and Morocco calls for cooking in steam chests at about 105 deg. C. (221 deg. F.) for 5 to 15 min., depending on the size of the sardine. However, sardines cooked in steam are not usually as good as sardines fried in fresh peanut oil of good quality. Moreover, very careful drying is usually necessary to avoid excess water in the product, as well as damage to the fish during handling. Also, there is no gain in time or labor over frying, because the whole canning procedure is just as unmechanized.

The French have never cooked raw packs in saturated brine, since the results of isolated trials were quite unsatisfactory. Cooking in "court-bouillon" (dilute brine flavored with herbs and spices) was resorted to during the war, but it is no longer used.

A brick radiating oven, made by Girodin in Quimper, was introduced in two or three sardine canneries in Brittany some years before the war. This small-capacity apparatus was not equipped with a conveyor for the grills; they had to be pushed through it. Nor did it have automatic controls for the heating and ventilating systems. We believe that its failure can be attributed to these factors, since, from the standpoint of quality, the results were good.

Radiant heat is, in the author's opinion, the best substitute for oil frying. Hence, it is gratifying to note the satisfactory results obtained in a factory in Morocco with a new type of cooking oven in which the radiant heat is supplied by infra-red lamps.

It may be noted here that electric lamps are by no means the only way of producing infra-red radiations. Gas- or oil-heated radiators would probably offer a more economical and practical solution. Heating by electric lamps, however, has the merits of ease of control and versatility.

The oven was manufactured by Ets. Marocains de l'Infra-Rouge. Of tunnel-type, with a chain conveyor carrying four standard grills abreast, it is about 30 ft. long and 7 ft. wide. Four hundred Philips 110v. 250w. lamps are fixed to four mobile frames under the roof of the tunnel. Distance of each frame from the fish can be individually controlled. In addition, the heating cycle can be modified by altering the amount of current fed to each group of lamps, by removing individual lamps, and by changing the linear speed of the oven conveyor chain.

Capacity is about 2 tons per hour, with a cooking time of from 7 to 9 min. The bottom of the tunnel is specially arranged for collecting the oil draining from the sardines, which in Morocco are very fatty.

Previous to cooking, the sardines are brined, then placed on the grills and dried as usual. From the operational point of view, this remains a great disadvantage.

The same can be said of another new device for cooking sardines—a hot-air tunnel oven built in Spain by G. Masso. For here, too, the fish are flaked.

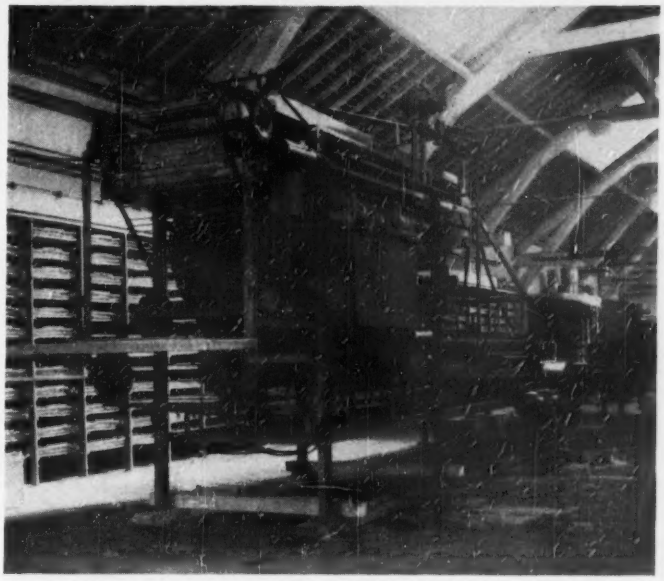
In this oven, the chain takes the grills through a preliminary low-temperature drying section, then through the cooking section proper, and finally through a cooling tunnel. Various models have been built, with one or two cooking tunnels, ranging in length from 100 to 200 ft. and 8 to 10 ft. in width. The capacity of the more recent models is 1,550 to 2,200 lb. per hour with medium size sardines. Drying and cooking take about two hours.

But Frying Does It Better

Many processors have rejected or not considered innovations in methods of cooking, in favor of continuing the high-quality frying process. For them, too, recent improvements have lowered costs or resulted in a more palatable product.

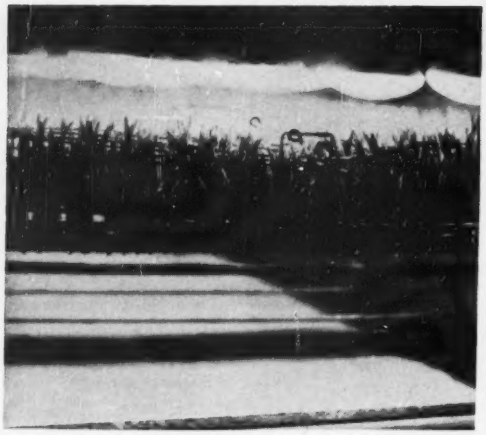
For example, a specially treated Nor-

But Old Way is Completely Out With This Machine

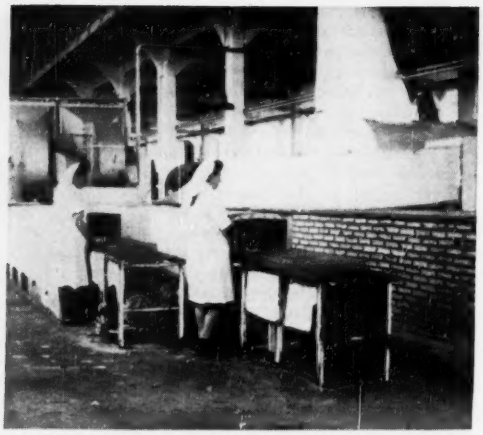


IN ONE END of this machine go raw sardines packed into oil-sprayed cans. They come out other end completely processed, with cans ready for seamer.

Two Ways of Cooking Sardines



FLAKED SARDINES are cooked by radiant heat under a battery of 400 infra-red lamps in this oven.



HOT-AIR TUNNEL oven, built in Spain, also handles fish in flakes. Oven has duct for hot air return.

wegian herring oil is now being substituted in some plants for the peanut oil formerly used. This is in the nature of a commercial rather than a technical improvement: The new oil is less expensive, but decidedly not as good as peanut oil, since it tends to develop a disagreeable odor.

A second improvement in the frying process concerns the recovery of peanut oil for recycling. The method was tried on a semi-commercial scale in 1938, but the war delayed commercial use.

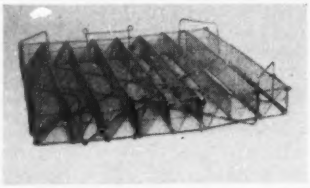
The principle of this procedure lies in the fact that the sardine oil, which contaminates the frying oil during use, has a tendency to give stable oil/water emulsions. This is probably due to its high content of unsaturated fatty acids. Emulsions of peanut oil in water are unstable and easily "broken."

This observation was made during experimental measurement of the surface tension to determine the quantity of sardine oil present in peanut oil. (The drop method of determining surface tension is an analytical procedure more simple, rapid, and sensitive than determination of the iodine number.)

It had been noted by Beard* that an emulsion was formed in the "foots" of the frying bath. And he suggested heating in order to break it, and adding back the oil thus recovered to the frying oil. On the contrary, the new method encourages formation of the emulsion, which is separated as such. This is done because it is desirable to reuse the peanut oil, but not the sardine oil (in the emulsion) because it imparts a bad taste to fried fish.

The frying oil/water emulsion is

* Beard, H. R., "Preparation of Fish for Canning as Sardines," U. S. Dept. of Commerce, Bureau of Fisheries Document 1020, (223 p.), Washington, 1927.



CLOSE-UP of flake used in processing most French sardines.

generated as fine mist by the use of a steam injector for spraying the oil into the chamber. This mist is partly precipitated by cooling. That part which is not precipitated entrains the most volatile and odoriferous compounds and removes them. The liquid is collected from the bottom of the chamber and sent through a centrifugal separator, where the clear peanut oil is obtained on one side and the creamy emulsion of sardine oil, together with the excess water, on the other side.

This procedure and the apparatus were developed jointly by J. Mocquard and the author for mixtures of peanut oil and fat from *Clupea pilchardus*. It is not known if the same conditions apply to other vegetable oils and to fats from different species of fish. For best results, the purification process should be started on fresh oil right at the beginning of the frying operation, with the oil then recirculated at a speed sufficient to keep it constantly clean.

It is thus possible to maintain the fish-oil content of the frying oil—as judged by the surface tension—down to about 1 or 2 percent. The advantage is twofold: An increase in the "life" of the oil, and an improvement in pack quality and uniformity.

Aside from the radical improvement in handling operations effected by the apparatus initially described, there have been few changes in many French sardine canneries. The old system of beheading and eviscerating, brining, flaking, washing, drying, frying in oil, draining, trimming and packing, oiling, then sealing, processing and cleaning the cans still holds. Beheading and eviscerating are usually done by hand, mainly because no efficient machine has yet been developed for performing these operations without lowering quality.

"To the Last Bit"

The viscera should be removed completely—down to the last bit of the intestinal tract—without damaging the fish, a difficult task with the fragile sardine, whose skin particularly is much less tough than that of either the herring or pilchard.

American machines of various types have been tried unsuccessfully. The only cutting machine doing the job almost properly is a rather complicated and costly device first designed by Lebot et Chauveur in Brittany and improved by successive manufacturers. Its small capacity, its inability to handle sardines of different sizes, and the fact that it does not save more than 40-50 percent of the labor, are sufficient reasons for its lack of success. This machine also places the fish on the flakes or grills, one more operation requiring much care, and in fact, better performed by hand. The fish are put tails up in rows, a position allowing better drainage.

When the grills are loaded with fish, they are dipped in water, or conveyed between sprays of water. Then they

are loaded on mobile trolleys and pushed by hand through drying tunnels.

On leaving the dryers, the grills are fed by hand to the conveyors of the frying bath, which automatically take them through the hot oil. Then they are drained, first on special tables, later on trolleys, where the grills are left until the fish are cold.

Trimming (of the necks and tails) and packing into cans are done by hand. The organization of these operations and the work of eviscerating has only recently been improved by the use of merry-go-round conveyors, either of the overhead or of the belt type.

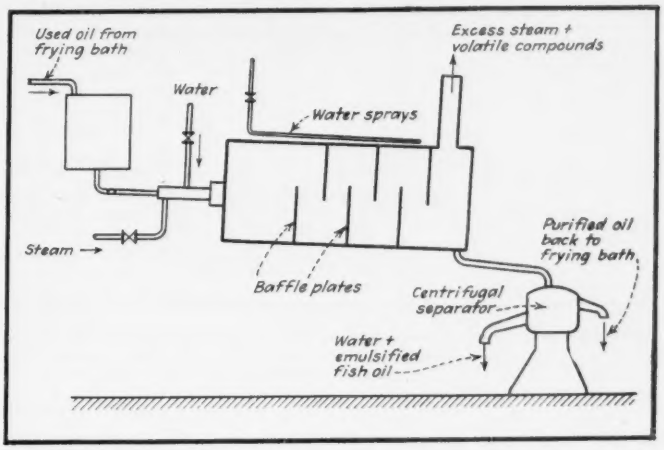
Cans are then filled with olive or peanut oil, by hand or by machines of the simplest kind, in which oil flows freely in and over the cans. The excess oil is collected, filtered and recirculated.

No exhaust is used, as a rule, mainly because no exhaust box has been available which completely eliminates the danger of condensed water droplets falling into the cans.

After seaming, the cans are processed in retorts, or, less frequently, in open baths, with no water cooling whatever. And they are finally cleaned with sawdust in a rotating drum. The latter is a very severe treatment, both for the seams and the lithography. The use of spray washing machines is, however, gaining ground, and in some instances the oil thus washed away from the outside of the cans is recovered and sold for soap manufacture.

The only other improvement in handling is the recent development of an eviscerating and brining trough by G. Massó. This has been introduced in some canneries in Spain and Portugal. The eviscerating is still manual, but is done over a flume running along the "table," so that heads and viscera fall into a stream of water and are carried away. The "table" itself is a long tank in which the fish are brined, the brine pumped out, and the fish taken from it and put on the grills. A conveyor then carries these grills under sprays of water, and to the cooking installation.

Sketch Shows How They Purify Frying Oil



SARDINE OIL contamination of peanut oil is held down to 1-2 percent in process. Separated sardine oil is being investigated for vitamins A and D.

A Frenchman Looks Askance at American Technics

Editor's note: With fingers crossed, we pass on to our readers the following brief—and pointed—critique of the "American sardine way". Author Cheftel penned it after visiting several of our canneries.

"Permit me to say that, just as the average Frenchman is shocked by finding wines in California, labeled 'Burgundy' or 'Sauterne', which although good, have no resemblance whatever to the genuine ones, so is the Franch canning technologist shocked on seeing the name 'sardine' applied to any small clupeoid fish ending its life in a can. Notwithstanding the opinion of the U. S. Bureau of Chemistry (Food & Drug Administration—Ed.), no fisherman or fish handler would ever fail to distinguish a sardine *(Clupea pilchardus)* from a sprat *(Clupea sprattus)*, a herring *(Clupea harengus)*, or a pilchard *(Sardinia coerula)*; and the gastronome, too, will appreciate the difference in the canned product.

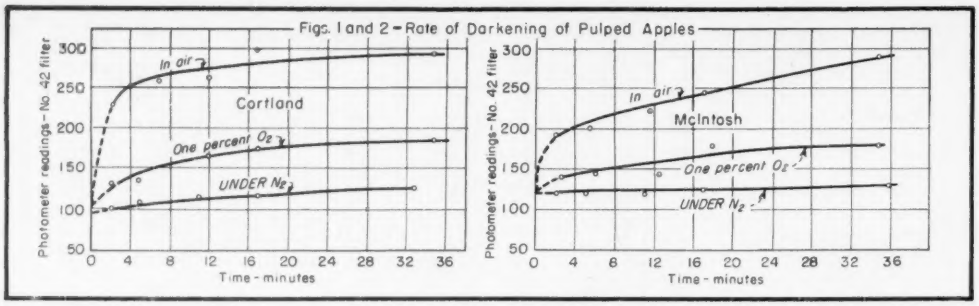
"All four kinds of 'sardines' are found and caught and canned on the French coast, each under its own name. Their qualities and prices are quite different, and the Service de la Repression des Fraudes—the French Food & Drug Administration—would not admit of any interchange of names. It may appear indeed unfortunate that the ichthyologist has labeled *Clupea pilchardus* what the local inhabitant of Brittany has for ages called sardine; and reversely that the zoological name *Sardinia coerula* has been given to the fish known to the fisherman as pilchard. However, this being the case, it may seem surprising that the priority in the choice of the name, usually granted internationally to the naturalist who first names a flower or a bacillus, should not be extended to the Father of the Canning Industry and his near followers, who first canned the sardine and called it sardine. Perhaps the difference lies in the fact that no commercial interests are attached to the scientific names of living organisms.

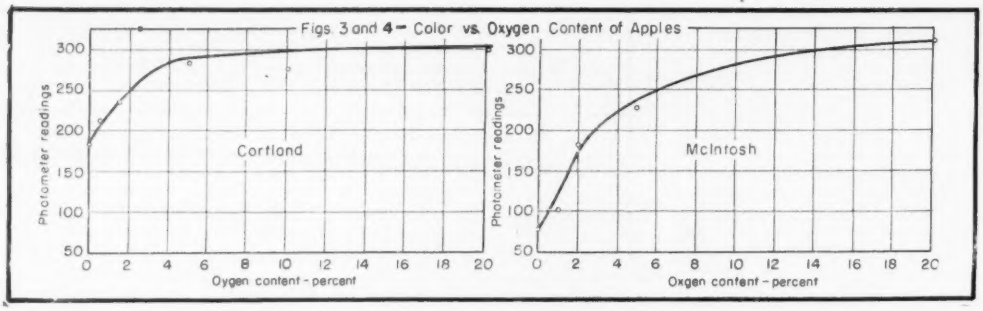
"As a matter of fact, what most strikes the French canning technologist visiting 'sardine' canning factories in Maine or in California, is still the lack of attention given to quality factors. This contrasts with the good sanitary conditions, especially the care taken in using fish in fresh condition, and the great care generally to be seen in the manufacturing operations of other branches of the canning industry in the United States.

"Apart from a few exceptions, canned 'sardines' are indeed a 'cheap' pack in the United States, even if they are a wholesome and nutritious food. The fish and the gastronome alike are given as little thought as possible, although there is no apparent reason why a better product should not be aimed at.

"It seems probable that the cooker (described in the first part of the accompanying article) could help in improving the quality of the pack, especially of the small herrings in Maine. If this should happen, the author, who is much indebted to many U. S. canners for their hospitality and to many American colleagues for valuable information, would find a justification for the above comments."

These Curves Quickly Demonstrate That—





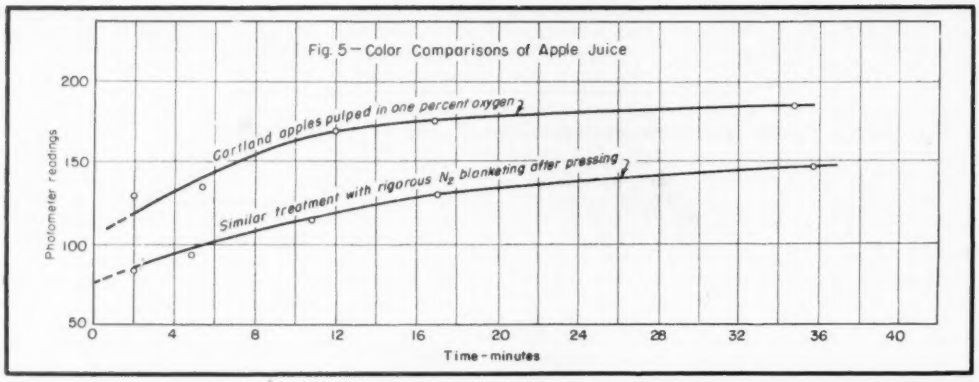


Fig. 5 – Color Comparisons of Apple Juice
Photometer readings
Cortland apples pulped in one percent oxygen
Similar treatment with rigorous N2 blanketing after pressing
Time – minutes

Juice Color Is Bettered by a Gas Blanket

In making apple drink, a nitrogen cover is applied during the fruit-crushing operation. And this retards subsequent discoloration when juice is exposed to the atmosphere

G. F. CHAMBERS

Laboratory of The Linde Air Products Company, Tonawanda, N. Y.

Discoloration of apple juice will be greatly reduced if the fruit is pulped in an atmosphere of pure, or nearly pure, nitrogen. For the gas inhibits oxidation of certain soluble components extracted from the crushed pulp.

Furthermore, removal of all suspended pulp by filtration and clarification will assure retention of the light color—even through prolonged exposure to the atmosphere.

In conventional commercial practice, whole apples are first washed and stemmed, then fed into a hammer mill

that reduces them to a lumpy pulp. This pulp is prepared for pressing by building up several layers, with each layer imbedded in a special press cloth and separated by wooden racks. Such a wrapped layer is called a "cheese." When the press has been filled with cheeses, the pressing operation is conducted by application of hydraulic pressure.

Expressed juice is strained through a rotary screen then clarified, either by centrifuging or by one of several well-known methods. Clarification with pectic hydrolyzing enzymes, known as Pectinol, is one of the best-known methods. Sterilization is usually accomplished by means of flash pasteurization. The finished juice is then packed immediately in glass or tin containers.

Vulnerable to Darkening

There is often a time interval between the pulping and pressing operations. Furthermore, the pressing itself requires almost one hour. During these periods, the pulped apple is oxidized severely by the large amount of air beaten into it during the pulping operation, and by contact with the atmosphere while standing. This results in the production of a very dull brown-colored juice, having a reduced appeal because it has developed cider-like flavors and color[1,2]. It has been suggested[3,4], that the antioxidant characteristic of ascorbic acid could be successfully employed in the production of a light-colored apple juice. Thus far, however, commercial applications along this line have been limited. Frankly, the cost of ascorbic acid—1½c. per 46-oz. can*—has proven prohibitive, according to the experience of many producers.

Nitrogen-Blanket Studied

For the present investigation, a series of experiments was initiated to determine: (1) The rate at which the pulp darkens; (2) effect of this action upon the finished juice, and (3) whether or not pulping in atmospheres containing varying amounts of oxygen would affect the rate or extent of discoloration.

Since all apples are not oxidized at the same rate, two varieties, Cortland and McIntosh, were used in these experiments. In order to make the operations as standard as possible, the amount of Pectinol to be added to the juice was first determined. And it appeared that for best clarification 5 lb. should be added to 100 gal. of juice.

Because the rack and blanket type press, used by the apple juice producers, does not lend itself readily to nitrogen blanketing, it was decided to first apply nitrogen blanketing to the pulping operation, with subsequent pressing of the pulp in air.

In these experiments, apples were first washed and cut, then fed into a laboratory pulper.* The pulped apple was collected on a shallow tray and exposed to air for varying time intervals, then filled into unbleached muslin bags and the juice extracted in a small press. The juice was treated with Pectinol, allowed to stand at room temperature for about one hour, and then stored at 35 deg. F. for one day under a nitrogen headspace, after which the clear, supernatant juice was separated.

A Klett-Summerson photometer with a No. 42 filter was used to measure the color of the juices. The photometer readings represent light absorption by the clarified apple juices expressed from pulp which had been exposed to air for various lengths of time. Increasing scale readings indicate increasing intensities of brown color in the juice. The effect of a very small amount of oxygen in the atmosphere was included in these data because of the possibility that apple juice manufacturers might not be able to maintain absolute exclusion of oxygen around the hammer mills at all times during the operation.

Light-Colored Pulp Produced

Table I and Fig. 1 show the effect of three atmospheres of varying com-

* Use of this pulper necessitated cutting whole applies into smalier pieces (under atmosphere control). Product was more finely pulped than that produced by a hammer mill. However, it was thought that results would still be comparable to those obtained commercially.

Pulping Atmospheres vs. Juice Colors

TABLES I & II—HOW OXYGEN CONTENT of Pulping Atmosphere Influences Color of Extracted Juice

Cortland Apples

Sample No.	Time In Minutes	Pulping Atmosphere	Photometer Reading No. 42 Filter
1	2	Air	229
2	2	1% O_2	131
3	2	0% O_2	100
4	4	Air	252
5	4	1% O_2	135
6	4	0% O_2	104
7	12	Air	265
8	12	1% O_2	168
9	12	0% O_2	111
10	17	Air	295
11	17	1% O_2	175
12	17	0% O_2	116
13	35	Air	290
14	35	1% O_2	185
15	35	0% O_2	125

McIntosh Apples

Sample No.	Time In Minutes	Pulping Atmosphere	Photometer Reading No. 42 Filter
1	2	Air	194
2	2	1% O_2	140
3	2	0% O_2	120
4	5	Air	205
5	5	1% O_2	145
6	5	0% O_2	120
7	12	Air	230
8	12	1% O_2	150
9	12	0% O_2	125
10	17	Air	245
11	17	1% O_2	175
12	17	0% O_2	125
13	36	Air	280
14	36	1% O_2	180
15	36	0% O_2	130

TABLE III—JUICE COLOR INTENSITY Increases With Oxygen Content of Pulping Atmosphere

(Small Scale Experiments Using Waring Blendor)

Sample No.	Oxygen Content Percent	Apple Variety	Photometer Reading No. 42 Filter
1	0	McIntosh	100
2	0	Cortland	155
3	1	McIntosh	125
4	1	Cortland	220
5	2	McIntosh	205
6	2	Cortland	245
7	5	McIntosh	252
8	5	Cortland	282
9	10	McIntosh	
10	10	Cortland	275
11	Air	McIntosh	330
12	Air	Cortland	305

TABLE IV—NITROGEN BLANKETING Improves Color of Cortland Apple Juice

Sample No.	Treatment*	Time In Minutes	Photometer Reading No. 42 Filter
1	a	2	130
2	b	2	85
3	a	5	135
4	b	5	92
5	a	12	170
6	b	12	120
7	a	17	173
8	b	17	130
9	a	35	185
10	b	35	145

*Designation (a): Apples pulped in 1 percent O_2, pressed and held in air 1 hr., and bottled in N_2. Designation (b): Apples pulped in 1 percent O_2, pressed in air, and immediately bottled in N_2.

TABLE V—COLOR COMPARISONS of Apple Juice Samples Subjected To Various Percentages of Oxygen

Mixture No.	Juice No.	Pulping Atmosphere	Pulp Used	Photometer Readings Original*	Photometer Readings Final**
1	A	1% O_2	dark D	138	318
2	B	1% O_2	dark B	118	230
3	C	1% O_2	light A	125	350
–	D	21% O_2	none	309	...
–	control	1% O_2	none	118	123
–	control	1% O_2	none	125	127

*Readings taken on original juice after clarification.

**Readings taken on reclarified juice after mixing with pulp and sparging with air.

position upon the rate of darkening of Cortland apples.

It can be seen that in an atmosphere of air the pulp darkens very rapidly and approaches its maximum darkness within a few minutes. However, the nitrogen-blanketed pulp remains light-colored and shows very little darkening even after extended periods of time. This slight darkening occurs only on the surface of the mass. A pulp treated in this manner would remain protected while awaiting transportation to the presses and while being made into cheeses. Holgate, Moyer and Pederson[3] stated that, when ascorbic acid solutions are used as antioxidants, the pulp darkens with great rapidity if it is allowed to stand in receiving containers before pressing.

Experimental work presented here also shows that the presence of very small amounts of oxygen resulted in a darker colored juice if the pulp is exposed to air for approximately one-half hour before pressing. For shorter periods of exposure pulping atmospheres containing a small amount of oxygen afford fairly good protection against discoloration.

Table II presents data on the McIntosh apples. In general, these data show the same effects of nitrogen blanketing that are displayed in Fig. 1. Again, the maximum rate of darkening is reached in about four minutes. However, it was found that McIntosh apple pulp was oxidized to the brown color at a slower rate than the Cortland. Furthermore, this variety does not produce a juice which is originally as light-colored as that from Cortland apples. These data are shown graphically in Fig. 2.

Small Tests Verify Previous Results

Some very small-scale experiments were also carried out using a Waring Blendor as the pulper. In this set of experiments, the apples (Cortland and McIntosh) were pulped under atmospheres of varying oxygen content and pressed immediately in a small fruit press. The juice was then treated with Pectinol and stored at 35 deg. F. for one day under a headspace of nitrogen.

The Klett-Summerson photometer with a No. 42 filter was again used to measure the light absorption intensities of the clarified juices. Table III compares the oxygen content in the atmosphere during the pulping operation with the photometer readings.

Cortland apples again reached their maximum rate of darkening a little faster than McIntosh. The rate itself is also greater when Cortland apples are used. These data are shown graphically in Figs. 3 and 4.

In the previously described experiments, carried out at this laboratory with nitrogen-blanketed apple juice, the unclarified juice was exposed to air for approximately one hour before it was stored at 35 deg. F. under a headspace of less than 1 percent oxygen. It was observed that, after standing in air for an hour, a shallow layer of brown discolored juice usually formed at the surface. It was thought that this discoloration was caused by the diffusion of oxygen into the top layer of juice, thus resulting in the oxidation of the very small particles of pulp which were suspended in the juice.

Air-Free Clarification Helpful

In order to determine the over-all effect of this discoloration upon the color of the final juice, a run was carried out in which the juice was exposed to air for only a few minutes during clarification. As the juice came from the press, it was treated with Pectinol, filled into bottles, and the headspaces filled with nitrogen. Table IV and Fig. 5 compare the darkening of juice given this added nitrogen blanketing to that of a juice made from nitrogen-blanketed pulp.

Although the rates of darkening of these juices are still comparable, it can be seen that, by not allowing an unclarified juice to become exposed to air, a lighter color is produced. In these experiments, some discoloration of the final product was observed when the unclarified juice was exposed to air for approximately one hour.

In most commercial operations, unclarified juice is first strained through a rotary screen to remove bits of pulp which have passed through the press cloths. This provides good aeration of the product. Following this, the juice is clarified. If Pectinol is employed for this purpose, clarification may take as long as 16 hr. Under these conditions, it may be seen that blanketing of the juice during straining and clarification would be necessary in order to produce a juice of the lightest possible color.

The aforementioned experiments have shown that apple juice does not turn brown as the result of atmospheric oxidation if it is separated from the pulp before opportunity for oxidation occurs. It was decided to investigate the system further in order to determine, if possible, the source of the coloring matter in air-processed juice. In an attempt to obtain evidence of this nature, a series of experiments was initiated in which juice and pulp were separated and recombined under various conditions.

Pulp Contains Darkening Substance

In these experiments, the pulping operations were performed in air and in an atmosphere containing less than 1 percent oxygen. Two runs were carried out under the latter condition. In both instances, a light-yellow pulp was produced which gave a pale yellow-colored juice when pressed. In one instance, the pressed pulp was allowed to darken in air, while in the other the pulp was deaerated and held under nitrogen. One run was carried out in an atmosphere of air. Both the pulp and the juice expressed from it were brown-colored. All the juices were clarified by the use of Pectinol, and their color ratings were determined by a Klett-Summerson photometer using a No. 42 filter.

Various combinations of light-colored juice with both dark and light-colored pulp were made. These mixtures were then sparged with air. The juices were re-extracted in the usual way and clarified with Pectinol. Measurements of color were taken on a Klett-Summerson photometer for comparison. As controls, two juices were each sparged with air in the absence of pulp, and their color measurements taken in the usual way. Table V gives the date obtained from these experiments.

From Table V it can be seen that the coloring matter present in a dark-colored juice is produced only in the presence of both pulp and air. Both juices A and B show a distinct darkening when sparged with air in the presence of dark pulp. The difference between the final photometer readings of these sparged juices is probably caused by a more efficient sparging of mixture No. 1 than of mixture No. 2. The data from mixture No. 3 points out that this darkening effect may be obtained with a light-colored as well as a dark-colored pulp if the pulp is in contact with air. That this darkening of the juice is not produced by aeration alone is evidenced by the fact that both control samples (which received the same amount of sparging as did all the other samples) showed only a negligible increase in their photometer readings.

References

1. Esselen, W. B. Jr., "A Study of Methods of Clarification and Blends of Massachusetts Apples For Apple Juice." *Fruit Products Journal*, 24, 165, 1945.

2. Pederson, C. S., Beattie, H. G., and Stotz, E. H., "Deterioration of Processed Fruit Juices." N. Y. State Agr. Expt. Sta. Bul. No. 728, 1947.

3. Holgate, K. C., Moyer, J. C., and Pederson, C. S., "The Use of Ascorbic Acid in Preventing Oxidative Changes in Apple Juice." *Fruit Products Journal*, 28, No. 4, 100-103, 1948.

4. Pederson, C. S., "Apple Juice With Original Character Retained." *Fruit Products Journal*, 26, No. 10, 299, 1947.

5. Lee, F. A., Beattie, H. G., Robinson, W. B., and Pederson, C. S., "The Preservation of Apple Juice By Freezing." *Fruit Products Journal*, 26, No. 11, 324-26, 1947.

6. Marshall, R. E., "Control of Quality In Processed Apple Juice." *Fruit Products Journal*, 27, No. 9, 280, 1948.

We Think . . .

■ New Minimum Wage Will Tend To Raise General Pay Level

By and large, food processors don't seem much concerned about the new 75¢ minimum hourly wage. Higher wages than that are the order of the times in most plants, except the smaller ones with seasonal operations. And exemptions take much of the sting out of the minimum for the latter type of processor.

But if we take a longer range view of the effect of the higher minimum wage, its significance changes somewhat. The tendency is for an increase in the minimum to exert an upward pressure on wages all along the line. This pressure will have the effect of eventually restoring the former spread between the lowest and highest wages.

In the long-run, too, one cannot be sure that present exemptions will prevail. Since the Administration is playing up to labor, industry will have difficulty in retaining minimum wage exemptions over the years ahead. Besides, there is some reason to believe that Washington already would like to see a still higher minimum wage in some industries.

All this adds up to the conclusion that in the long run all food plants should gear their operations to a higher wage level, minimum and otherwise. That is, they should develop modernization programs which will permit a profit despite higher wages.

The job to be done in some areas of the food industry is no small one. This is shown by a study of the wage structure of the canning industry in eleven states, recently made by the Bureau of Labor Statistics. This study reveals that some cannery workers in all of these states make less than 75¢ an hour. In seven of the states, significant percentages of the cannery labor are under this level.

In Louisiana canneries, the straight-time average hourly rate for the peak season of 1948 was 53¢ an hour; in Arkansas, 54¢. Nearly 50 percent of the women in the Louisiana canneries worked for 40 to 45¢ an hour. Half of them in Arkansas averaged 50 to 55¢.

A little advanced food plant engineering—particularly better materials handling—would go a long way toward reducing the amount of labor needed in many canning plants. And considering the savings, the equipment is inexpensive. Certainly, it is worth the cost if it will keep a company in the black in the years ahead.

But an increase in the minimum wage has some rosy aspects, too. It will increase the buying power of workers in many areas, particularly the South. And since people in the lower income groups spend more and more on food as their incomes go up, the market for processed foods will be increased.

So taking the industry as a whole, the higher minimum wage may not be such a bad thing after all.

■ Progress on a Platter—Or So Few Do So Much for So Many

Two interesting cooperative food research projects at Georgia Agricultural Experiment Station are being sponsored by The Refrigeration Research Foundation and the National Confectioners' Association.

One of the projects is to evaluate candy quality and shelf-life as affected by five different storage temperatures (including 0 deg. F.), four relative humidities, and various periods of storage. Thirteen types of candies are involved.

The other project compares the temperature-humidity-time effects of dry and refrigerated storage for peanuts and pecans when fabricated into coated and uncoated candy bars.

Both are very commendable projects. They should bring out information of particular value to confectioners, as well as to the cold storage warehouse industry, and perhaps to the peanut and pecan industry.

However, the initiative for these projects, as well as a considerable portion of their financing, came from The Refrigeration Research Foundation. Which brings up a point: It is one of the mysteries of industry that so many people wait for progress to come to them instead of going after it. This is not to disparage these projects but to stress the fact that much of our vaunted American progress depends on the vision, initiative, enthusiasm, persuasiveness and ginger of a few—a pitifully few—men like "Dutch" Diehl, Technical Director of The Refrigeration Research Foundation. May their number increase!

■ Reserves Should Be Used To Put Plants in Top Condition

Depreciation reserves have recently received their usual periodic attention from the American Institute of Accountants. And the Institute's publicity tells us that most American corporations "have not deviated from previous accounting practices." Well—hardly! About the only way to get a change in accounting is to fire the accountant and get a different one. Accountants hate change like the devil hates holy water. To get one to change his ways is like changing the name of "Arkansaw"—if you can remember that far back.

Depreciation reserves—to forget the accountant for a moment—should not fool you. These reserves may be all right for income-tax purposes. Important, however, is what the reserve actually is—not what it is for. A reserve may be labeled "depreciation," but is it money? If it is not money, what can you buy with it?

A depreciation reserve in cash or negotiable securities will buy a lot more new equipment than a reserve represented by a factory yard, vacant property, bricks and mortar, goodwill, or anything difficult to convert into cash.

In the current situation, there is a three-way contest to see who gets the cash. Earnings of corporations are generally declining, while dividends are going up on the theory that lesser amounts of cash are required than heretofore. But labor is also trying to get to the cash—and doing fairly well at it. So the competition is between customers, labor and stockholders.

Where does this leave the depreciation reserve? And

where does the non-cash reserve leave the production department when it needs new equipment? It begins to look as if the production department should also enter the competition for the cash and get just as much new and modern equipment as it can justifiably use in the foreseeable future. This is not a suggestion to merely beat the labor union or the stockholder to the cash box. Perish the thought!

We are thinking of the need to have all plants in top condition without need for early replacements. Not only will properly equipped production lines cut costs to meet competition, but they will help carry you through a period of recession. And they will be of vital value in the event an international emergency should make it difficult or impossible to obtain new equipment.

■ Accident Prevention Is an Integral Part of Everyone's Job

There have been so many examples of reduced costs through accident prevention that most food processors must be aware of the opportunities which safety measures offer. We told some months ago, for example, how one food company saved $1,000,000 a year by curtailing accidents.

But some do not realize that it takes concentrated effort on the part of everyone in a plant—from management to the most obscure worker—to make a safety program function effectively. Safety should be just as much a part of the job as production, and this applies to executives as well as to machine operators.

Safety competition is one way to focus attention on accident prevention. Such competition may be between departments and plants in the same company, or between companies in an industry. The first industry-wide safety competition in the meat packing industry, sponsored by National Safety Council, has demonstrated what can be done. Carried out in 77 plants and covering 175,000 man-hours, the contest cut the accident rate 41 percent below the normal rate for the industry. The contestants had the safest work year experienced by any group of meat packers.

The results of the contest eliminated the old alibi of management that certain packinghouse operations are naturally dangerous. It also destroyed the excuse of some executives that a small plant can't have as effective an accident prevention program as a larger company. Neither the size nor nature of a packing plant's operation had a conclusive influence on the safety record.

Any food processor who does not have a safety program has no right to complain about the high cost of his operations, nor about the high turnover among his personnel. And any groups of top management executives who do not put safety on a par with their other day-to-day responsibilities are not doing a good job.

■ Lessons for Prepackagers in PMA Experiment With Corn

Factors significant to the fast-growing vegetable prepackaging industry are revealed in the Production & Marketing Administration's report on its sweet corn experiments at Ruskin, Fla.

PMA husked the corn mechanically, trimmed the ears to 3-in. and 5-in. lengths, hydrocooled them, packaged them in trays overwrapped with cellophane, and precooled the product in refrigerated storage rooms. Then the corn was distributed to 28 terminal markets and retailed in about 200 cities east of the Mississippi River.

The prepackaged corn retailed at $5.40 per 5-doz.-ear crate, compared to $5.04 for corn in bulk. Slightly more than half of the sweet corn buyers preferred corn in bulk at this comparatively small price differential. Those who bought the prepackaged corn like its "visibility," flavor, and the ease of preparation, the latter being the chief preference factor.

Growers' net return on the prepackaged corn was about the same as for corn marketed in bulk in the usual manner. But retailers made a higher profit on it, principally because waste and spoilage losses were less and retail labor costs substantially lower.

This test seems to prove the feasibility of prepackaging corn for distant markets, provided prepackaging facilities include a hydrocooler and a refrigerated room.

But the experiment also seems to indicate that the price of prepackaged corn can be but little higher than that of bulk corn if it is to sell in volume. And there is the crux of the situation. It calls for highly efficient prepackaging, plus education of retailers to keep the mark-up reasonable. We recall a new supermarket which priced bulk corn at 6 ears for 29 cents and prepackaged corn at 4 ears for 33 cents. There isn't much future in prepackaged products that sell at a price premium of 70 percent.

■ Slow Freezing May Be Good Enough for the Home, But —

Whether vegetables are quick frozen or slow frozen makes no difference as far as quality and vitamin content are concerned, except for asparagus. Or so says New York State Agricultural Experiment Station after freezing peas, snap beans, spinach, corn, lima beans and asparagus at three rates of speed—very rapidly, very slowly, and at intermediate rates.

Investigating home freezer requirements, the researchers also report that the slower freezing rates allowed a small amount of bacterial growth until the freezing temperature was reached. But, they say, the bacteria slowly died during freezing storage.

As for the asparagus, its texture as a cooked vegetable may be altered if it is frozen too rapidly or slowly, the study shows.

These findings are a bit surprising. And while a homemaker's pride might make her satisfied with the results of her own slow freezing operation, it would be risky for a commercial frozen vegetable packer to adopt such a practice. Even the slightest lowering of frozen food standards cannot be tolerated. The whole future of these products rests on consistently high quality.

There has long been some controversy, however, as to the precise value of quick versus slow freezing, and this study adds fuel to the fire. But the final answer can come only from thorough research on products produced in commercial plants and distributed through commercial channels.

Such research also should include the economics of fast versus slow freezing.

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The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

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No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

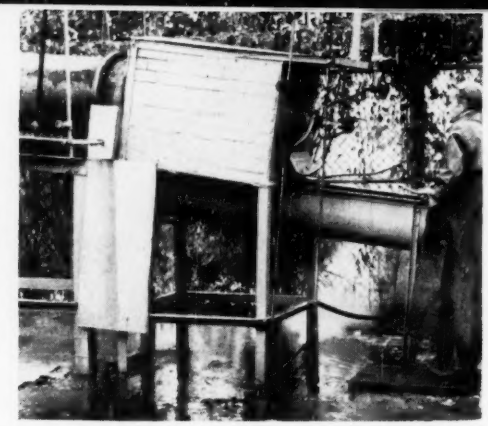
Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

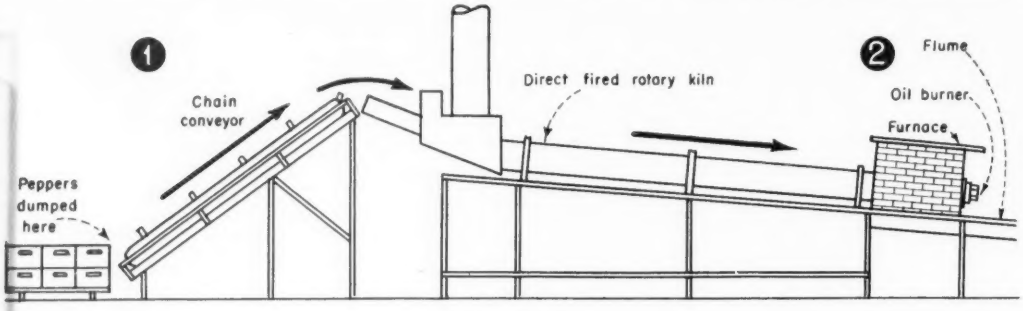
NASH ENGINEERING COMPANY

31 WILSON, SO. NORWALK, CONN.

1 **PALLETIZED** farm-boxes of peppers are delivered to the roasting line by industrial power trucks.



2 **FIREBOX AND BURNER** used on direct-fired rotary kiln. After charring, peppers go into the flume conveyor.



Modern Sweet Pepper Processing

Improved Methods Minimize Hand Operations, Curb Product Losses

IMPROVEMENTS in the preparation of sweet peppers at the plant of P. J. Ritter Co., Bridgeton, N. J., have enabled the company to turn out a superior product more economically.

The old brining method of removing skins—which involved tedious hand work—has been replaced by a roasting method with a number of continuous-operation features. Further, new instrumentation and laboratory checks have achieved better control of quality. And former costly product losses have been greatly reduced.

In the past, peppers were cleaned and then packed in wooden barrels of brine to remove the skins. Throughout a long aging period, the barrels were rotated regularly by hand. Losses were considerable and costly.

Each step of the improved process now used by Ritter is illustrated in our accompanying flow diagram. As shown (above, left), peppers in boxes are first unloaded from farmers' trucks by lift trucks and delivered to the roasting line. They are then dumped onto an elevator that empties them into a direct-fired rotary kiln.

Next, charred peppers coming from the kiln are carried by a flume conveyor to a rotary high-pressure spray washer. Here, the charred skins are removed. Then the skin-free peppers pass through a crusher and screen separator, and the peppers are delivered free of seed pods and most seeds.

Trimming and inspection are the next steps, followed by two further washings and then a steaming. In the steam bath, the peppers are softened, facilitating packing in small jars. The time cycle is controlled by variable speed drive. Temperature regulators insure uniform softness and texture. Steamed peppers are spray cooled to permit hand packing.

At this stage, temperature-regulated proof boxes are employed to insure maximum removal of occluded air before closing in vacuum. An electromagnetic lift then fills the retort crates with jars. Next, filled crates are transferred to a battery of retorts.

In the retorting operation, the process variables—time, temperature and pressure—are automatically controlled by instruments. Coming from the retorts via monorail, crates of hot cans are finally passed through a cooling tank, and the finished product is then ready for storage or shipping.

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ADVANCED FOOD PLANT ENGINEERING

FI Picture-Flowsheet 13

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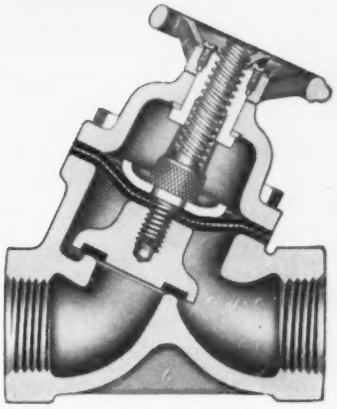

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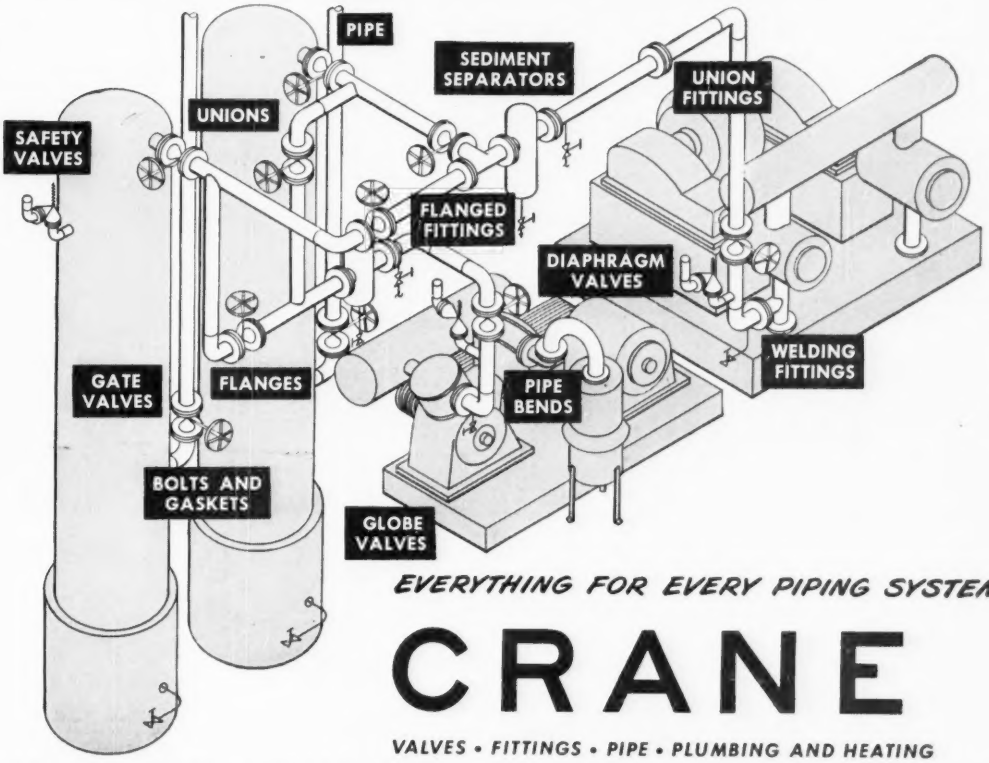

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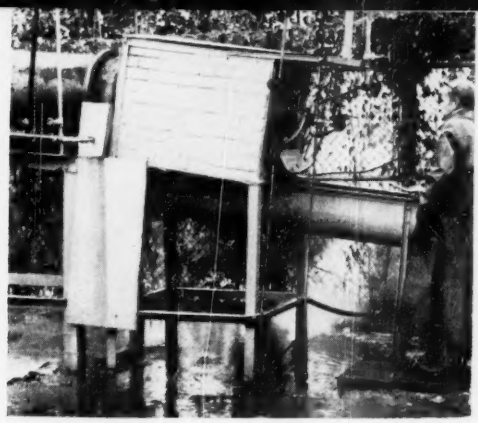

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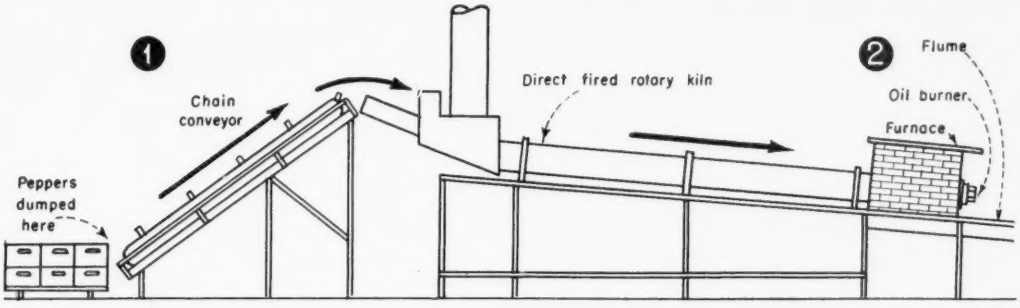

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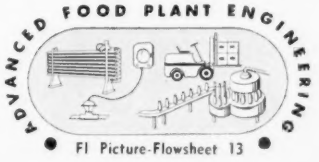
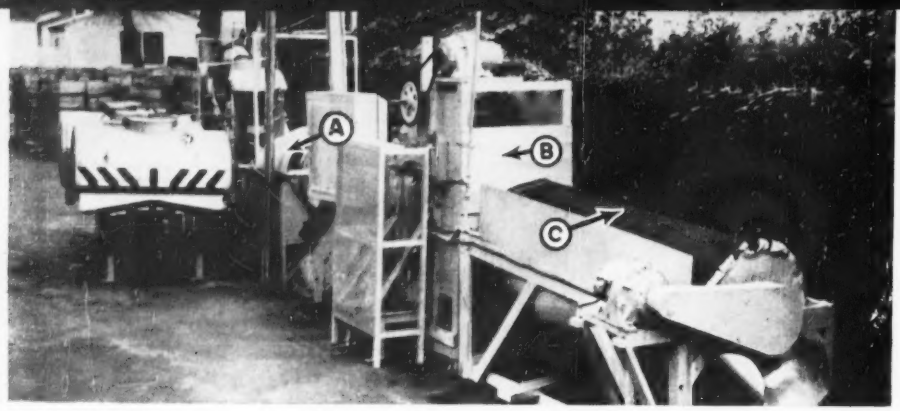
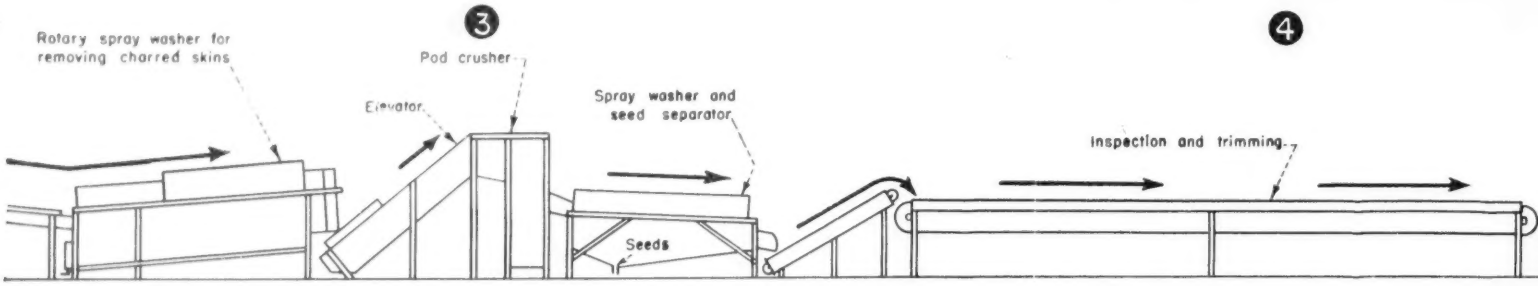


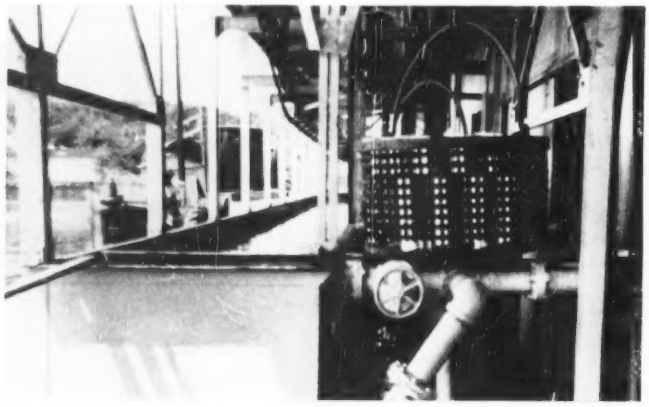


3 **NEXT,** peppers enter a high spray washer (A), where skins are removed. Skin-free peppers are then elevated to crusher (B) that releases seed pods. And screen separator (C) removes the seeds.

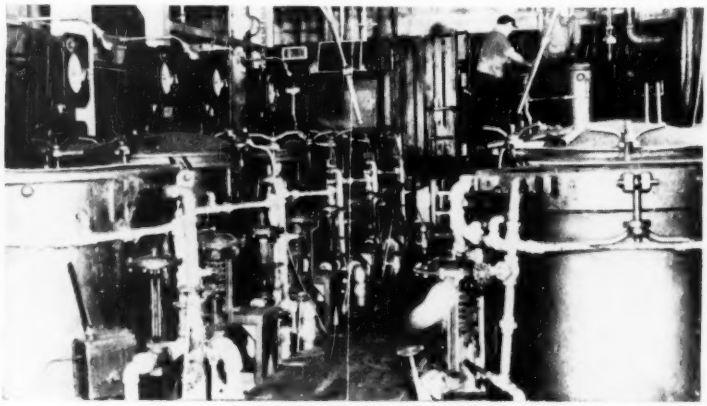
4 **ALONG** trimming and inspection tables, operators remove any remaining charred skins, and all blemished, green or unripened fruit.



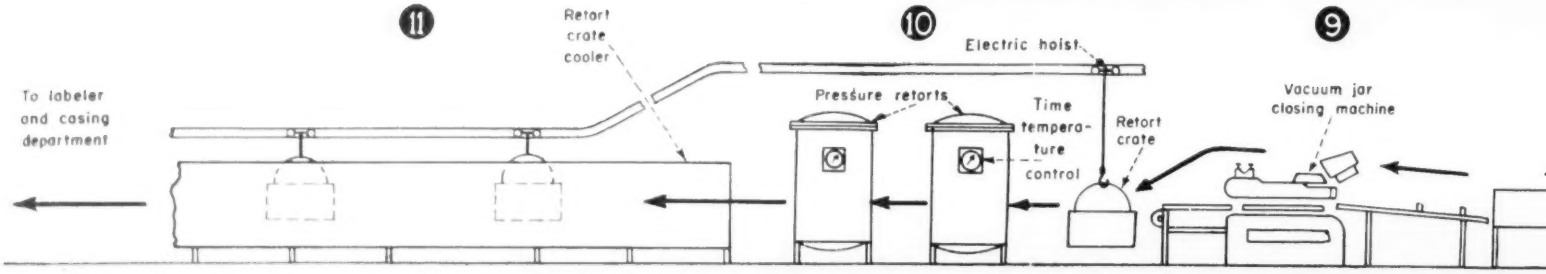
11 **CRATES** full of hot jars finally travel via monorail to, and through, the cooling tank located outside the canning building proper.

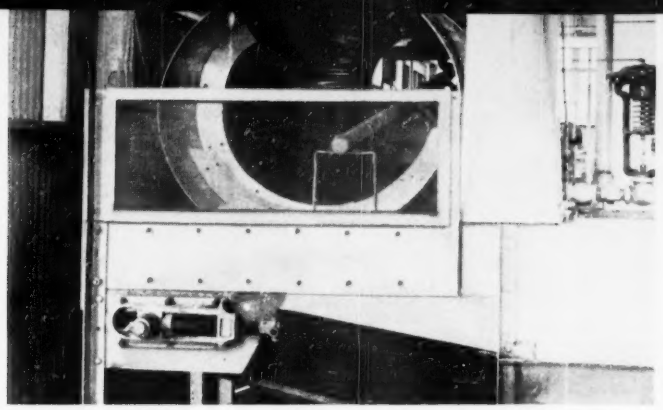


10 **RETORTS** are set up in a battery. In the operation of these units, time, temperature, and pressure—the process variables—are instrument controlled.

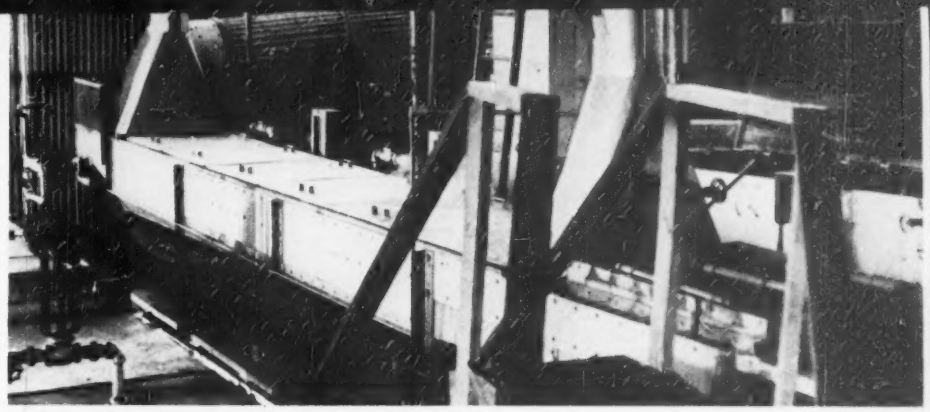


9 **CLOSING M**
"for vacuum

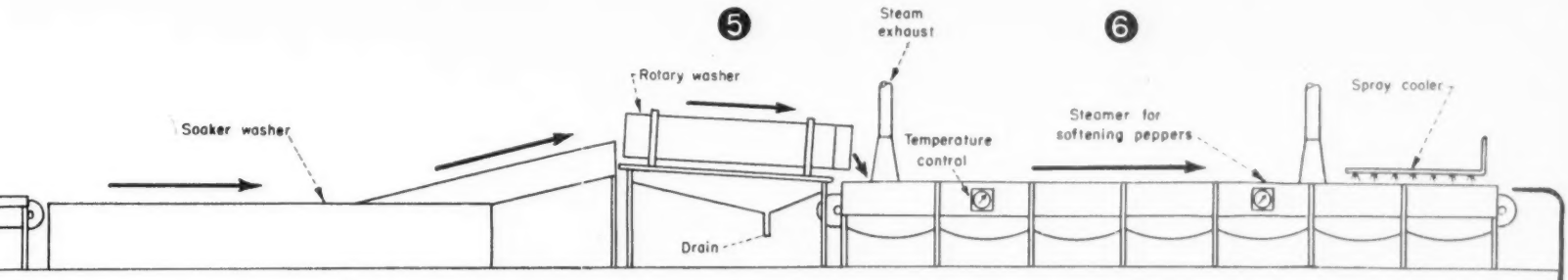




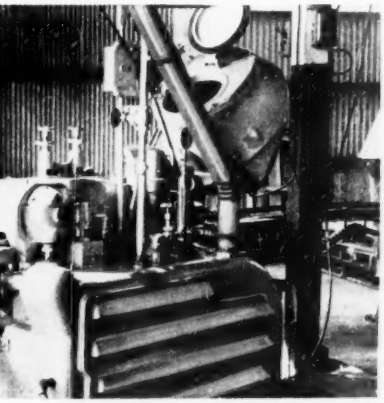
5 **ROTARY WASHER** (center) equipped with water sprays, follows a soaker washer for thorough cleaning of trimmed peppers.



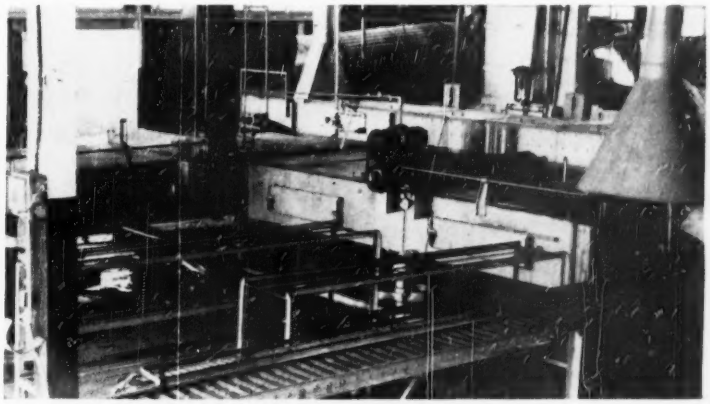
6 **THROUGH** steamer (center) washed peppers travel at controlled speed on a continuous woven-wire belt conveyor. Temperature in this bath is regulated by control instruments.



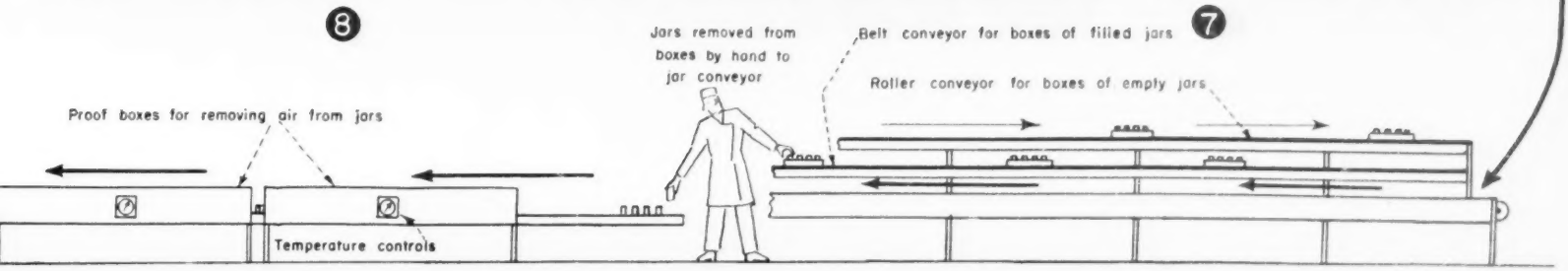
NG MACHINE receives jars direct from proofer cuum packing.



8 **PAIR** of proof boxes (center) is at right angles. These heat-treat units insure maximum removal of occluded air prior to vacuum packing.

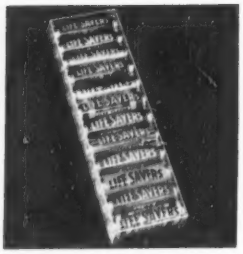


7 **EMPTY** glass jars in trays arrive at packing tables on roller conveyor.


8
Jars removed from boxes by hand to jar conveyor
Belt conveyor for boxes of filled jars
7
Roller conveyor for boxes of empty jars
Proof boxes for removing air from jars
Temperature controls

NEW IDEAS FOR FOOD PACKAGING

COLORFUL WRAPPERS of Plaxpak polyethylene film are now used to package the bubble bath tablets made by Trylon Products Corp., Chicago. The film forms a soft yet tough wrap that is moisture-resistant and will not tear during the packaging operation.



COMPLETELY SEALED, AIR-TIGHT and dust-tight, this Polyflex* salesman's sample display box gives desired rigidity, optical clarity, and eye appeal. Designed by Life Savers Corp. Fabricated by National Fabrilite Corp. New Haven. Polyflex* is low in cost.

TUSSY'S WIND AND WEATHER lotion comes in an appealing Plaxpak polyethylene bottle shaped like a snowman and "dressed" in a black hat, black buttons and red woolen scarf. Unbreakability of bottle makes it convenient to use and carry anywhere.

HEWITT EMPHASIZES RE-USE value of Plaxpak polyethylene bath salts bag fabricated by Kellogg Container Division, U. S. Envelope Co. Soft to the touch, the Plaxpak bag is tough and durable — a smart package in every way, full of sales appeal.

POULTRY WRAPPING in Plaxpak polyethylene film is fast, economical and completely protective. Plax supplies this tough, tear-resistant material as sheet and Layflat tubing. Converters make it available in pre-cut sheets, bags, etc., for convenient application.

SPARKLING, NEW IDEA in cologne packaging is introduced by Eugene, Inc., New York, with their Light of My Heart. The stippled Plaxpak polyethylene bottle, set in wooden base, simulates a lamp post in design. Squeezable spraying feature is used.

★ In addition to its packaging products, Plax makes a wide variety of thermoplastics in rod, sheet, tube, and other forms.

Even the old cracker barrel could have benefitted with Plaxpak polyethylene film. This moisture-vapor resistant, tough and flexible material would have kept the crackers fresher longer. Imagine what it can do for your product today—in preserving, presenting and protecting goodness. Look, too, at Polyflex* polystyrene; in quantity, the lowest cost transparent film available. And keep in mind the Plaxpak polyethylene bottle, with its new packaging opportunities. Please write for specific data on how Plax products can improve food packaging.

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. . . is not subject to cutting, crushing and rapid wear.
circular disc permits positive shut-off even should the
fail. Y-pattern body design assures greater flow capa-
city, minimizes pressure drop. Crane separate disc-
diaphragm design reduces appreciably the torque
required to operate these valves. For further informa-
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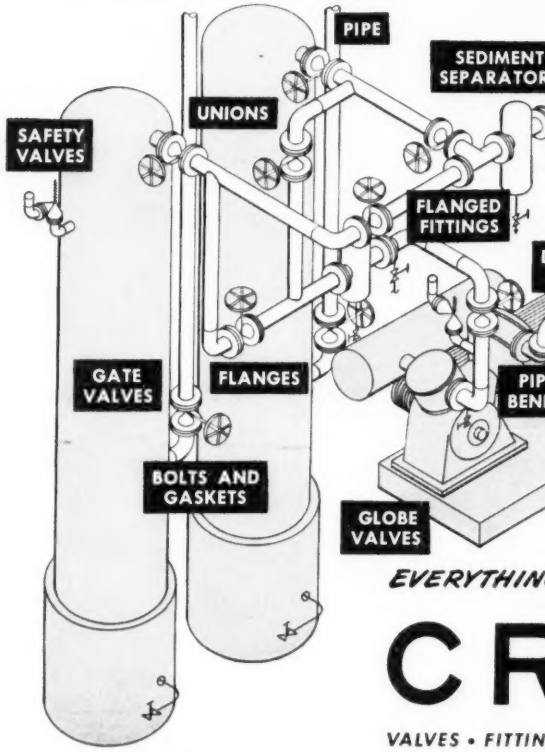

EVERYTHIN

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VALVES • FITTIN

FOOD INDUSTRIES, JANUARY, 1950

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disc-diaphragm
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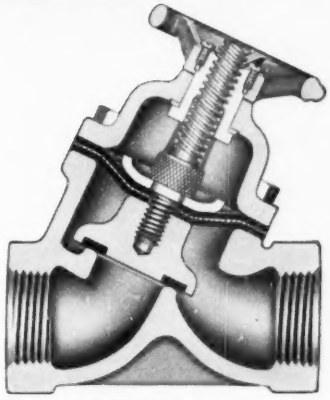

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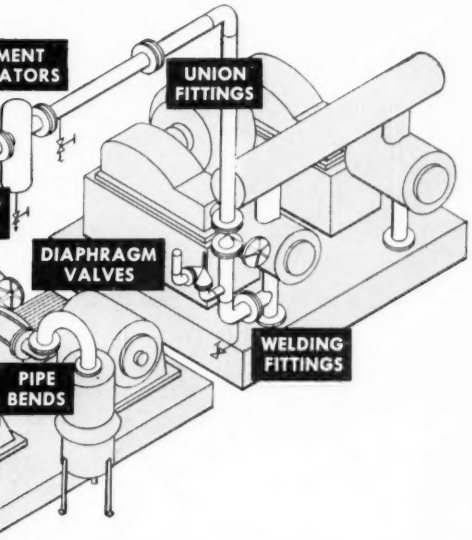
LATION, FOR EXAMPLE



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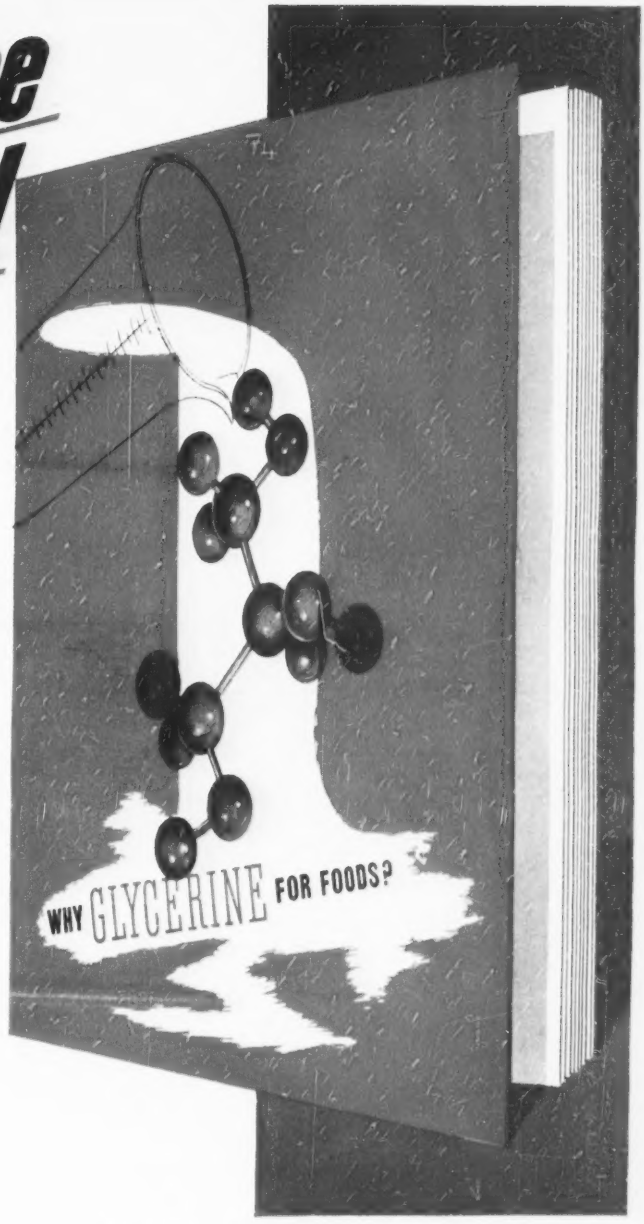
"Why Glycerine for Foods?" has been reviewed by a number of technical consultants as well as the Research Laboratories of the Glycerine Producers' Association. Contains detailed information by charts and tables of the physical properties of glycerine—the origin, development, and chemistry of this amazingly useful alcohol—grades and their applications. 16 pages of practical, useful data!

Whether you now use glycerine or just wonder about its possibilities... whether you're in management, production, or research ... an expert on glycerine, or thoroughly unfamiliar with the subject—you'll want this informative booklet. Write for your free copy—today! *Address: Dept. 8, Glycerine Producers' Association, 295 Madison Avenue, New York 17, New York.*



One of a series of five booklets on the industrial applications of glycerine. Also available on request: Why Glycerine? (a general survey of all main uses) ... Why Glycerine for Alkyd Resins and Ester Gums? ... Why Glycerine for Drugs and Cosmetics? ... Why Glycerine for Textiles?

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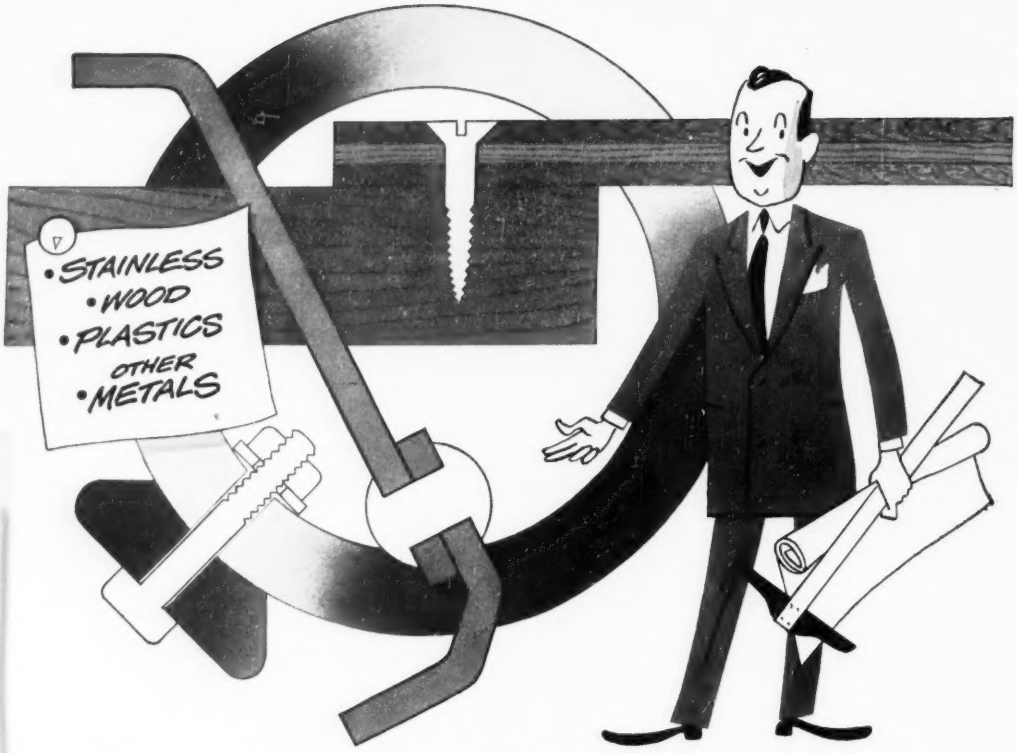

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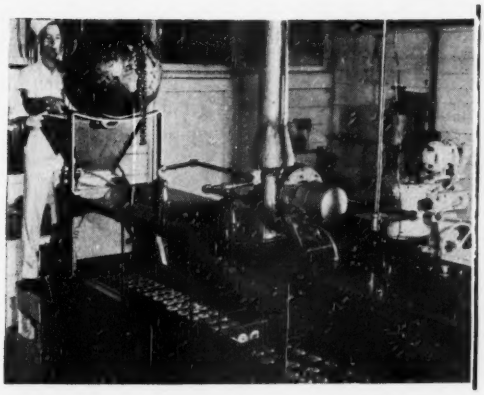
PRACTICAL IDEAS



Snuff!—And Your Fat Fire Is Out

Use of cooking fat presents a worrisome fire hazard. Accordingly, far-sighted commercial food processing plants install automatic fire extinguishing equipment to protect their investment in buildings, machinery, raw materials and finished products.

A machine (see photo) turning out 300 doughnuts per hour is operated at the Swans Bakery plant in Knoxville, Tenn. And to guard against hot-shortening flash fires which might be set off by electrical spark or overheating, the company has installed an automatic CO_2 fire extinguishing system. Fire protection engineers of Walter Kidde & Co. specially designed the installation to control this flammable-liquid hazard in the food industry.

CO_2 does a good job—is quick-acting, safe, will not contaminate food in process, or damage power-driven equipment. Further, it is a non-conductor of electricity and leaves no messy residue.

The system installed at this bakery consists of a 50-lb.-capacity CO_2 storage cylinder with automatic discharge head, piping, nozzles, heat actuator, manual release, damper pressure trip, and power cut-off switch.

If fire breaks out in the doughnut machine, the heat actuator detects it almost instantly. A pressure wave of expanding air in the actuator-bellows travels through copper tubing to the cylinder discharge head, which automatically releases the CO_2. Stored as a liquid, under 850-psi. pressure the CO_2 rushes under its own power through the piping and is discharged by three hooded multijet nozzles (in the accompanying picture, these nozzles are seen directly above the glass-enclosed top of the doughnut machine).

Reaching the nozzles, it changes into a gas, expands to 450 times its stored volume, and spreads a dense blanket over the surface of the burning oil. This completely excludes air from the fire—snuffs it out quickly without damage to the shortening, dough being cooked, or the machine itself.

Discharging CO_2 actuates a pressure-operated trip in the piping line, and this automatically shuts a damper in a ventilating duct entering the top of the machine. Included is a pressure-operated switch for shutting off power to the electric heater in the doughnut machine and the motor driving it. The system is completely self-contained and needs no outside power source.—*W. E. Morgan Jr., Manager, Industrial Div., Walter Kidde & Co., Inc.*

$25 EXTRA FOR BEST ITEM

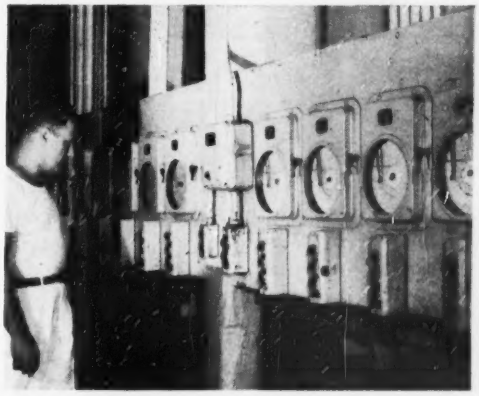
You are invited to submit items for this "Practical Ideas" department. You will be paid at regular rates when your item is published, and if it is judged the best for the month, you will receive additional pay of $25.

Selection of the best contributed item will be made by a group of 200 readers each month, and the name of the author and item title will be cited in these pages in a subsequent issue.

"Practical Idea" items may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. The item may concern factory, laboratory, warehouse, or power-plant operations in the food industry. "Practical Ideas" pertaining to management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit "Practical Ideas" items. The text will be edited and sketches converted to finished drawings.

Send your items to: "Practical Ideas" Editor, FOOD INDUSTRIES, 330 W. 42nd St., New York 18, N. Y.



How Ammeters Can Help

There is a battery of twelve ammeters hooked up to the chocolate coating refiners at the S. F. Whitman & Sons candy plant in Philadelphia. These electrical instruments have two major functions: They indicate to the processor: (1) how the refiners are operating, and (2) any changes in the viscosity of the coating during refining.

Thus the operator has a better control over the quality of the chocolate coating being manufactured. Also, overloads are prevented on the motors through automatic cut-outs. So the motors no longer burn out because of such overloads, and accordingly down-time from this source is eliminated.

Normal operation of the refining mills calls for 26 amp. And during normal operation, red lights continue to burn on each instrument. If the motor pulls too high a load, say 30 amp., a relay automatically kicks off the motor.

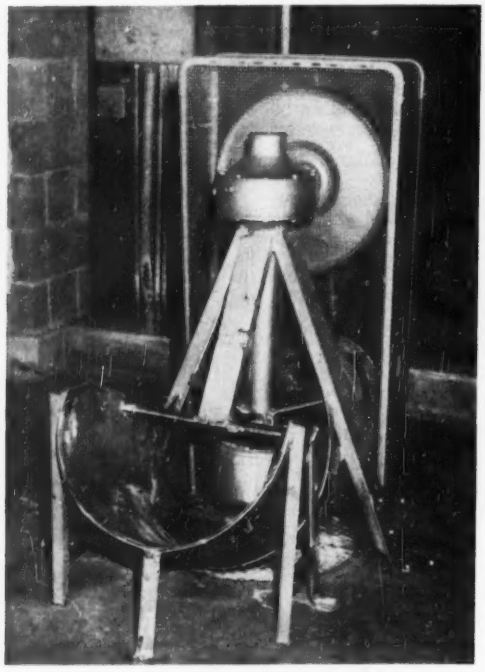
Ammeters also are used in food processing plants to control mixing operations. Connected in the circuit of a motor driving a dough mixer, for example, the ammeter

BEST ITEM—To T. J. Kullman, Production Manager, Bowman Dairy Co., Chicago, goes an additional $25 for his Practical Idea item, "Two Conveyors Fed From One," in November FI. Reader-judges voted this the best among the contributed items

—The Editors

shows when the gluten-breakdown point is reached because of a variation in the viscosity of the dough and hence a change in the load on the motor. Such a hookup can be made to stop the mixer automatically.

These instruments are also used on present day macaroni machines, where they indicate to the operator whether the dough in the press is too dry or too wet. By adjusting the water feed into the mixing unit, dough of uniform consistency is produced. Morover, the operation is speeded, for these units operate continuously.



Mixing With Old Ford Rear-End

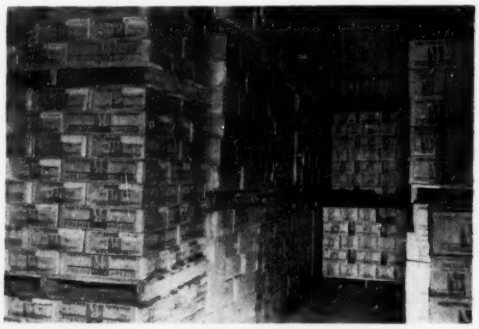
At the new Coca-Cola bottling plant in Madison, Wis., caustic bottle-washing fluid was originally mixed in an air-agitator unit. Dumped in at the top of this mixer, the caustic caked on the bottom, because of improper or insufficient agitation. And so, it had to be removed by hand.

But with a new plant-fabricated mixing device, the caustic is now dissolved without settling or caking on the tank bottom.

What happened was that the plant superintendent designed and built his own mechanical agitator. This new assembly (see photo) consists of the rear-end of an early model Ford, plus a shaft with blades attached, filling chute, and manhole cover.

The mixing tank is located on the floor directly under this assembly. From above, the shaft, supported by metal beams welded to the shaft housing and anchored to the floor, extends down to the bottom of the mixing tank. Blades attached to the shaft revolve at 18 rpm. Gears and shaft are V-belt driven from a motor at the side of the assembly.

Half a steel drum on welded steel legs forms a chute into which the caustic is dumped. The chute feeds the caustic through an opening in the floor around the shaft to the mixing tank on the floor below.



Now They're Stacked Upside Down

When palletizing was adopted for handling finished case goods at P. J. Ritter Co., Bridgeton, N. J., particular attention was given to the question of breakage of glass-packed products. And in the course of the investigations, an interesting fact was learned from a simple test.

A case of catsup in glass bottles was dropped right side up from knee height to the floor. Then a duplicate case was dropped upside down from the same height. In the case that was dropped right side up, several bottles were broken. But none was broken in the case dropped with bottle necks down.

When the test was repeated dropping the cases from near shoulder height, there was still greater breakage in the right-side-up case, but again not a bottle was broken in the case dropped with the necks down.

As a result of this test, all cases of glass-packed products are now palletized with bottle necks down and bottoms up. And breakage is rare.

Processors Might Try Blast-Cleaning

Food processors sometimes borrow, from unrelated industries, practical ideas which pay off. And it seems that the blast-cleaning technic employed in the metal-working field may be the answer to some difficult food-plant cleaning problems.

In blast cleaning, an abrasive selected to suit a particular application is discharged at high velocity against the surface to be cleaned, the abrasive being propelled by air pressure or centrifugal force. This is the same method that has been widely employed to clean metal castings and, with a soft abrasive, to remove carbon from airplane engine parts in maintenance operations.

Air-blast equipment is made in small portable units, and soft abrasives—such as ground corncobs or walnut shells—can be utilized to remove film from a surface without damaging the surface itself.

Blast cleaning might well ease the job of removing deposits—such as milkstone or beerstone—from equipment. And it could speed the task of preparing corroded or sealed surfaces for painting.

New Weighing System Cuts Production Costs

Food, confectionery, and bakery product manufacturers report substantial savings with Wright's Hy-Tra-Lec Weighers. Shown above is an installation at Becker Pretzel Bakeries, Inc., one of the big Eastern names in the pretzel and potato chip industries.

(For Technical Readers: Hy-Tra-Lec has neither beam nor spring scales. Utilized for the first time in automatic machinery are the principles of "positive displacement," resulting in a weighing accuracy at high speeds which exceeds previously accepted standards. You would observe with interest the simplicity of the weighing unit itself and the integration of the vibrator feed. Indications point to the possible conclusion that this new weighing system may be regarded in the future as having opened an entirely new vista in weighing engineering.)

Wright's Hy-Tra-Lec Sets New Mark For Accurate, High Speed Weighing & Filling

Push production costs down by net weighing and filling more accurately at high speeds. That's the money-making move taken by a growing number of manufacturers packaging a variety of foods, confections, and small bakery products.

Wright's Hy-Tra-Lec Weighers will make a real dent in your 1950 cost figures. Fully automatic operation for rigid containers. Semi-automatic when bags are used. Available with single or multiple weighing head units. Range: One-half ounce to 16 ounces.

Products handled to date include hard candies, wrapped candies, gum slices, marshmallows, pretzels, potato chips, cookies, crackers, corn chips, shelled nuts, small metal and wood parts, cranberries, and a host of food products.

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Food Equipment News

It Can't Jam—Look ↑ What Came Through

No-Clog Pump Moves Larger Solids, Uses Less Hp.

A radically new idea in pump design has produced a centrifugal pump that won't clog.

Increased tolerance in size and types of solids handled, reduced liquid volume essential to good pumping, and lowered operating and maintenance costs are the outstanding advantages of the new bladeless impeller pump over the conventional centrifugals used for handling sewage, industrial wastes and other flumed solids.

In conventional centrifugal pumps, a series of rotating vanes picks up the fluid, then whirls it outward by centrifugal force into a collecting ring that connects to the outlet pipe. These pumps push out liquid at constant pressure or speed. If used for liquids containing solids, such pumps have to be made oversize because trash and solids sometimes tangle in the vanes. And they require frequent overhaul to dig out rags, trash, and various fibrous materials lodged on the whirling blades or caught between them and the stationary housing.

The new unit, however, does away with this difficulty. For here a revolving helical tube has replaced the conventional blades. Hence, practically anything which passes through the pipeline can now be handled by the pump.

The picture above illustrates how items that would quickly clog the conventional unit readily go through the new pump. Both the long laboratory coat and the shop overalls (held by Inventor R. C. Glazebrook) passed through without any trouble whatsoever.

Also seen in the photo are oranges and apples which came through without any difficulty. And even hard-boiled eggs were used in the demonstrations of the pump's performance staged by the manufacturer.

In view of these tests, this unit should be of particular interest to the food processing industry.

The pump's suitability for handling flumed fruits, vegetables and other food products is further borne out in that the apples emerged with only very slight bruising. And even the hard-boiled eggs were delivered with little damage—merely an occasional cracking of a shell.

It is well to note that these materials passed through two 90-deg. bends in their travel through the outlet pipe. The slight fruit-bruising and shell-cracking damage was in all probability occasioned by the force of the water driving these solids against the sides of the outlet pipe.

These tests clearly indicate the pump's ability to handle flumed tomatoes, corn, peas, fish, whole fruits, purees, soups, pulped fruits and vegetables, particularly in the washing and preparation stages of processing these foods.

How It Works

Described in simplest terms, the pump consists of the same type of housing, stand or base, and drive as other centrifugal pumps. It differs only in the design of its impeller (photo lower left).

Centrifugal force still does the work; but the fluid, instead of passing between vanes and being thrown outward by them, passes through a rotating tube wound somewhat like a helical screw (photo lower right).

In operation, rotation of the helical tube segment exerts a suction on the inlet side. Starting with a small radius at the axis of rotation, this curved tube then fans out in a helical path. Centrifugal action throws the fluid against the sides of the tube, and since these slant outward, the fluid is driven along the tube, in this manner, achieving the pumping action. At its narrowest point, the diameter of the rotating tube is equal to the diameter of the inlet pipe.

Since there are no edges, sharp angles, or blades to catch or hold any fibrous materials in the fluid being pumped, there is no opportunity for lodging or clogging. And, since the tube diameter is the same as the inlet pipe, the pump is capable of handling in a continuous manner any solid delivered through the inlet pipe.

These Are the Benefits

This performance results in these three prime advantages: 1. Eliminates need for an oversize pump to move solids of a given dimension (usually it takes a 4-in. pump to handle 3-in. solids). 2. Reduces volume of water, or other liquid pumped, necessary to handle a given mass of solids. 3. Enables use of smaller size motor (5 hp. does work which with conventional centrifuge would require 7½ hp.).

These advantages mean that the pumping capacity of this bladeless pump need be only about one-half that of a conventional pump for any specific solid size.

To distribute the load weight about its axis and to minimize an eccentric thrust during the operation, the heavy portion of the rotating tube segment is balanced on the other side by a counterweight.

Attached at a tested position on the exterior surface of the impeller, this counterweight is shaped and positioned to serve also as a shield. It prevents fibrous strands from accumulating between the impeller and its housing and around the impeller hub when the pump is submerged.

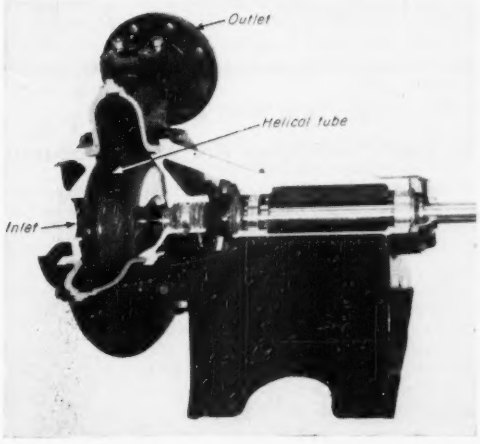
Although newly announced, this pump has been under development and extensive industrial test operation for over five years. It is now available in 2- to 5-in. sizes, selling competitively with conventional centrifugals. It can also be had in different metals. And it is interchangeable with conventional units in existing installations.

The pump can be quickly and easily cleaned with hot water solutions or steam. However, its assembly does not yet permit of easy, quick disassembly for cleaning.

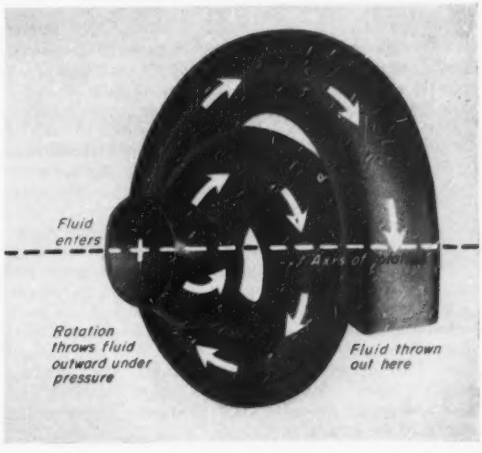
The impeller can be cast with a highly finished interior surface and may be polished to a degree.—*Fairbanks, Morse & Co., Fairbanks-Morse Bldg., Chicago 5.*

(Food Equipment Continued)

Section Through Pump . . .



. . . And How Tube Does the Trick



DON'T MISS THESE . . .

Cleaning time is saved in new filter that features automatic cake removal.....Page 108

At-a-glance dial on new hydrostatic gage tells milk tank contents .....Page 110

Conveyor switch provides three-way travel for wheel or roller-type units .....Page 110

Water and sewage screen is self-cleaning, needs only minimum space .....Page 112

AND WATCH FOR . . .

Continuous quick freeze unit capable of handling 4,000 pound packages per hr.....In February FI

New hydraulic press—a roller type, continuous-feed unit built on new principle.....In February FI

New Starter's Mechanism Entirely Sealed

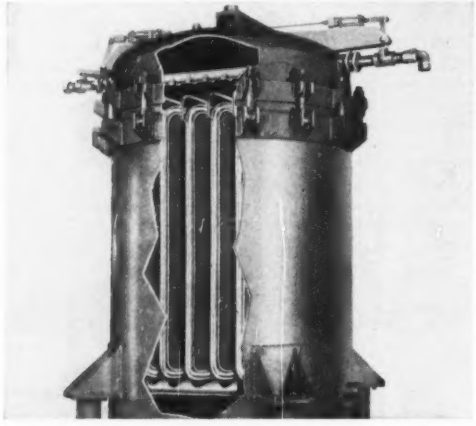
For use in industries in which corrosive vapors or combustible dust laden atmospheres are present, a new wall-mounted, full-voltage starter, designated Type 371, has been announced.

The unit has its entire mechanism immersed in oil and sealed from the atmosphere. It is weather-proof, hence can be used for outdoor installations. Starter enclosure is entirely corrosion resistant. Head casting is of aluminum alloy, all exposed hardware is stainless steel, and the steel tank is coated with aluminum paint on the outside and marine spar varnish within.

Built for simple installation and easy inspection, the starter controls squirrel cage motors and the primary of wound rotor motors of 350 hp. or less at 2,300v. It is actuated by a pilot device, such as a pushbutton, float, or pressure switch.

Either undervoltage protection or release may be incorporated in the control circuits used in conjunction with the starter. A built-in drum-type multistage auxiliary switch provides for extra circuits in the control system.

A portable lifter for simplified inspection is available as optional equipment.—*Allis-Chalmers, Milwaukee.*



Cleaning Time Saved in New Filter

Automatic sluicing of filter cake is now possible through the development of a new filter. Known as the "Auto-Sluice", this filter permits completely automatic cake removal and disposal. Need for opening filter at end of each cycle to sluice cake from the leaves is eliminated.

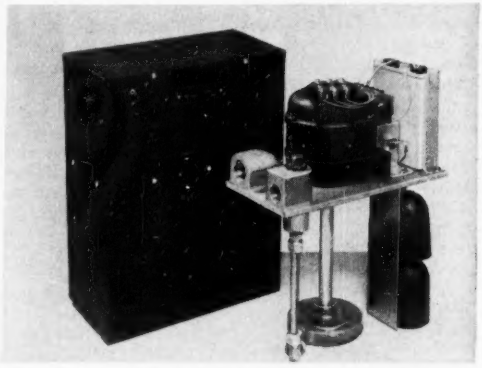
The sluice unit is built into the filter cover. It consists of a header into which high pressure spray nozzles are fitted. These latter are so positioned that the sprays of sluicing liquid strike the cake of each leaf. Air motors impart both rotary and reciprocating motion, assuring thorough cleaning of all surfaces. Simple adjustments provide regulation for speed and limits of movements of header.

Performance records of the "Auto-Sluice" in actual service show that filter cakes up to 35 cu.ft. can be removed in as little as 15 min. with only 70 to 100 cu.ft. of water.

Automatic cleaning eliminates time and labor ordinarily required to loosen cover eyebolts, open cover, and manually wash down filter cake at end of each cycle, and then retighten cover. In this way, the design decreases down time cycles and increases total productive filtration time and daily production.

With automatic sluicing, a single operator can take care of a multiple battery of filters. Another advantage is that the filter cake does not have to be handled at all. By suitable arrangement of piping, it can be discharged under pressure in a largely repulped condition direct to waste or delivered to other points throughout the plant for further processing.

Filters are available in sizes from 120 to 500 sq.ft. of filter area and can be built in steel, stainless, various alloys and other commercially available materials of construction. —*Niagara Filter Corp., Buffalo, N. Y.*



"Trouble-Free" Condensate Disposal Unit

To provide efficient and trouble-free disposal of small quantities of condensate from air-conditioning equipment, a new disposal unit, designated Model No. 2, has been developed.

It incorporates fully automatic control, compact rugged rustproof construction, quiet dependable operation, and a ball bearing motor. Unit is adaptable to all standard air-conditioning units.

Model No. 2 is equipped with a bronze centrifugal sump type pump, 1½ gal. brass receiver, float operated switch, check valve on outlet side of pump, 1/40-hp., 3450 rpm., single-phase, 60-cycle 115v., totally inclosed capacitor start motor.

Unit is encased in a black enamel finished sheet brass cabinet 5¼ in. wide x 9⅞ in. long x 13 in. high. The bronze centrifugal pump is capable of delivering approximately 4 gpm. at 0 psi. and has a shutoff pressure of 12½ psi. The inlet is ¾ in. N.P.T., and outlet is ½ N.P.T. Weight 21 lb.—*Eastern Industries, 296 Elm St., New Haven 6, Conn.*

SS Heat Exchangers Are Mass Produced

Complete standardization and stocking of all component parts have made possible a new low-cost stainless steel heat exchanger.

Identical in design and capacities to the maker's well-known all-copper exchangers, this model, Type SSCF, utilizes stainless steel to avoid contamination or corrosion by fluids. Series incorporates all recent advances in thermal engineering, according to manufacturer, and is offered in a complete range of sizes tested to 450 psi. to withstand strenuous usage.

Units are available for immediate delivery.—*Ross Heater & Mfg. Co., Buffalo 13, N. Y.*

(Food Equipment Continued)

He's got the WORDS...We have the FACTS!

Yessir,
WEST TERAMINE
IS AMAZING!
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Sanitizes...
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cleans...disinfects
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PROCESSING EQUIPMENT • PACKING EQUIPMENT • REFRIGERATORS • TANKS • STORAGE BINS • FREEZING UNITS • TRUCKS • CONVEYORS WALLS • FLOORS • WASHROOMS, etc.

Yes, without exaggeration, here's the many-in-one germ-killer you've been looking for! A quaternary ammonium compound that does most every cleaning job *better* and *faster*. West Teramine thoroughly sanitizes, cleans and disinfects all kinds of food equipment *without leaving an ODOR*. Does the same for walls, surfaces, floors and washrooms. Kills bacteria, molds and fungi *everywhere*.

IT'S "SURFACE-ACTIVE"

West Teramine is more powerful—has extra penetrating power because it's faster-wetting and "surface-active." More versatile—a slight change of dilution adapts it to any need. More economical—a little goes a very long way. In recommended dilutions, West Teramine is non-poisonous, tasteless, and won't irritate the skin.

PROVE IT FOR YOURSELF!

See Teramine in action! Learn why the entire food industry is sold on it. You'll be sold too after one demonstration.

Other WEST Products that Promote Better Food Industry Sanitation:

LIQUID SOAPS AND DISPENSERS • FLOOR MAINTENANCE • PROTECTIVE CREAMS AND PROTECTIVE APRONS • INSECTICIDES AND INSECTICIDAL EQUIPMENT • WASHROOM SANITATION • KOTEX VENDING MACHINES • and others.

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☐ Please send me a free sample of Teramine—*plus* booklet!
☐ Please arrange to have your representative demonstrate West products.

Name_____ Position_____
Company_____
Address_____ 5

New

FLEX-a-FOAM Filter Mask

Dust Protection

Your Workers Welcome

and *WEAR*

Simple construction (only four interlocking parts), breathing ease and attractive styling of the new Flex-a-Foam Filter Mask assure real wearing acceptance by your workers.

Featherweight positive-locking frames of molded plastic adjust themselves with comfortable snugness to every size face. Of DuPont Polythene, frames are so tough they're unbreakable in normal usage.

Flex-a-Foam's filter is a honeycomb construction of whipped foam latex — keeps out nontoxic nuisance dusts as small as 1/25000 of an inch! It holds its shape and can be washed in warm, soapy water for long sanitary usage. It's easier to breathe through than an ordinary pocket handkerchief!

Headband of molded natural rubber with exclusive method of adjustment that keeps mask snug and comfortable — no tension or hair pulling.

Workers enjoy its comfort, and you like the efficiency and economy of Flex-a-Foam, lowest priced *quality* respirator ever made. Send $1.50 for postpaid single mask.

ATTENTION AGENTS AND JOBBERS

Your interest is invited

The Goggle Parts Company — Dept. C.
Cleveland 13, Ohio

Please send full information and prices on Flex-a-Foam Filter Masks.

Name_____

Position_____

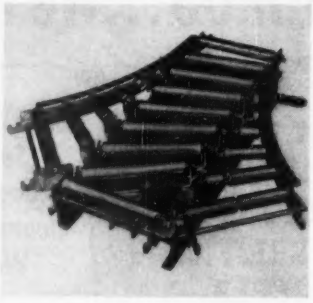
Company_____

Address_____

City_____ Zone_____ State_____

THE GOGGLE PARTS COMPANY

CLEVELAND 13, OHIO



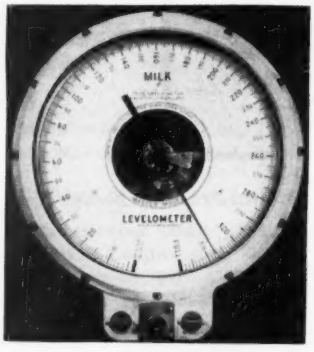
New Switch Provides Three-Way Travel

Choice of straight-through, to left, or to right travel of commodities from a main line on roller or wheel conveyors, is now provided by a new switch.

Unit consists of a series of pivoted straight rollers, forming the central or main line, which can be manually turned left or right to divert commodities either way. Or the rollers may be set straight for through travel.

These pivoted rollers are controlled by a hand lever, extending on both sides of the switch, allowing control from either side. Mounting and control is such that when turned for deflecting to either side, rollers always remain in true radial position, providing the carrying effect of a regular curve.

Switch is complete with 45-deg.-curve spurs on both sides and is fitted with Universal hook and rod couplings, so that straight or curved sections may be quickly attached.—*Standard Conveyor Co., North St. Paul 9, Minn.*



At-a-Glance Dial Tells Level of Milk Tank

To meet the exacting requirements in the dairy field, a sturdy, simple and sanitary dial-type hydrostatic gage, for use on milk and ice cream mix tanks, has been developed. It is known as the Milk Levelometer.

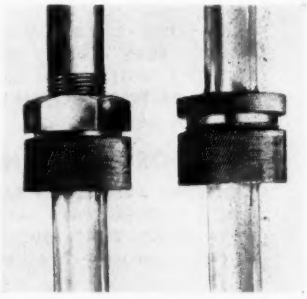
The instrument is a remote-reading, dial-type, bellows-actuated, hydrostatic gage that enables the operator to determine the tank's contents at a glance. Indicating pointer automatically and instantly responds to slight changes in milk level and can be depended upon to render years of service.

Since the meter is dial-type, no indicating fluid is required for its operation. It does not in any way interfere with plant operations when it is being installed. Dial can be graduated in cans, gal., lb., ft. and in., or any other unit of volume or weight measure.

Another feature is a built-in vent valve with which the operator can quickly and easily check the pointer's zero position. If for any reason pointer is slightly off zero, it can be reset by turning an easily accessible knob located at bottom of gage housing.

Two or more indicators can be mounted at different locations and connected to one air bell to indicate tank contents.

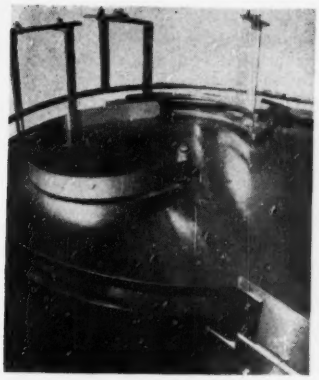
High or low switches can be furnished with this gage to actuate an alarm or to control either a pump or a remote control valve.—*Liquidometer Corp., 36-01 Skillman Ave., Long Island City 1, N. Y.*



New Glass-Pipe Couplings Are Installed Faster

Used with Pyrex-glass pipe lines, a new threaded metal coupling greatly simplifies the installation of such piping by replacing the three-bolt triangular metal flanges. Use of wrenches is no longer necessary. Perfect alignment is assured, and danger of breakage due to uneven take-up is eliminated.

Installation time is reduced up to 60 percent in comparison with alternate methods. Metal couplings are available from stock in sizes ½, ½, ¾, and 1 in. for making glass-to-glass or



Cuts Out Manual Effort

Latest improvement to company's rotary unscrambling tables is this spring-steel diverter. After a case of bottles or containers is emptied onto the table, this device automatically discharges each item to conveyor in single file.—*Island Equipment Corp., 27-01 Bridge Plaza N., Long Island City 1, N. Y.*

---

glass-to-metal connections. The former type connection is illustrated at the right in photo, the latter at the left.—*Fisher & Porter Co., Hatboro, Pa.*

Unit Supplies Lubricant At Constant Pressure

Purpose of a new weight-loaded lubricator is to deliver lubricant at constant pressure in any desired quantity.

Typical uses are: Application of lubricant to stuffing boxes of pumps and mixers, line shaft bearings, motors, and lubricated valves.

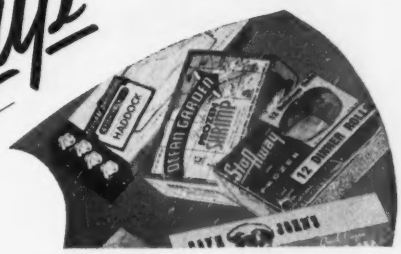
By using weights of different values and infinite adjustment throughout the length of a lever arm, pressures may be applied to lubricants up to 150 psi. The device has a bracket for universal mounting, with a shut-off valve available as optional equipment.

Position of the lubricator arm gives an exact indication of the amount of lubricant in the cup, and provides a positive warning when the lubricant supply runs low. Grease cup, with a capacity of 8½ oz., has a conical bottom to facilitate lubricant passage.

Lubricant may be replenished without disassembling by supplying it through a standard grease fitting located at the bottom of the cup.

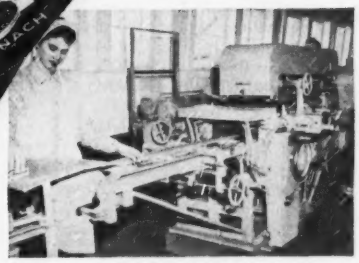
Lubricator weighs 20 lb. and is available for immediate delivery.—*Mixing Equipment Co., 1024 Garson Ave., Rochester 9, N. Y.*

Speed up



your wrapping of frozen foods

You'll have a better selling package, too!



Model FF in plant of the Rocky Bay Fishing Company

Get ready now for speedier, better wrapping of frozen foods—*at lower cost.* The Model FF—most popular wrapping machine in the frozen food field—offers a combination of advantages obtainable in no other machine.

Turns out well over 100 perfectly wrapped packages per minute. Handles trays, cartons or metal-end fibre cans with equal facility . . . Makes allowance for cartons that vary in size . . . You can wrap before or after freezing . . . Special type conveyor prevents spilled produce from being carried into the machine . . . Superior type of end-fold mechanism locates printed matter on ends of wrapper perfectly. Wraps with any type of material used for frozen foods, and is quickly adjustable for various sizes.

Virtually a single unit, the Model FF can be easily transported from plant to plant, an advantage in handling seasonal packs.

Learn why more and more packers are standardizing on the Model FF. Write or phone our nearest office for particulars.

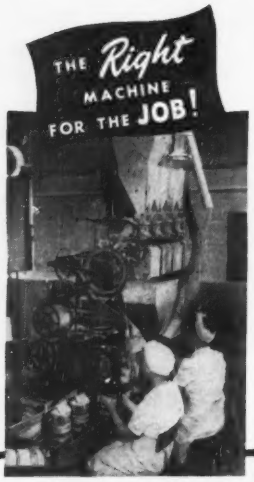
Literature on request

PACKAGE MACHINERY COMPANY • Springfield, Massachusetts

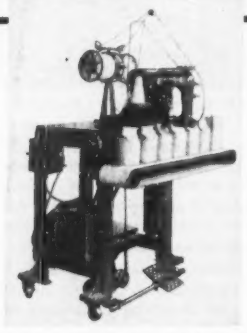
NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines



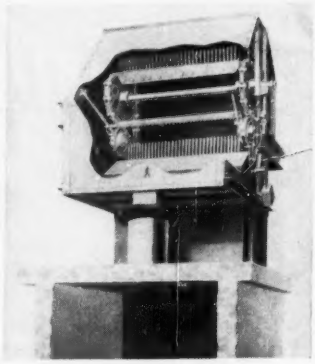
No two jobs are exactly alike—that's why Union Special builds a wide variety of bag closing equipment. It's also the reason why Union Special field representatives make a careful study of requirements before giving you detailed recommendations on the kind of equipment to install. *If it's "Union Special," it's right for the job!* UNION SPECIAL MACHINE COMPANY, 450 North Franklin Street, Chicago 10, Illinois.



Style 21800 N bag closing machine equipped with Style 60000 D sewing head for making Union Special's exclusive Dubl-Tape closure on small paper bags.

Union Special

Bag Closing Machines



Water and Sewage Screen Is Self-Cleaning

Trash and large solids are efficiently removed from water and sewage by a new screen recently developed for water, sewage and industrial waste treatment plants.

Known as the "Thru-Clean Screen", its primary elements are a permanently supported rack of vertical steel screen bars and a power operated screen-bar-cleaning mechanism. The cleaning unit employs two endless parallel strands of chain between which are fastened two or more steel rakes at evenly spaced intervals.

Rake teeth engage screen bars through screen rack from downstream side, and are moved upward through the bars to the discharge point. Here, screenings are discharged by a pivoted, counter-weighted wiper plate.

Screenings are discharged on upstream side of screen rack to a belt conveyor for disposal elsewhere, or into a trough from which they can be raked by hand into either a shredder or a screening-can.

Machine is operated by gearmotor and encased roller chain drive connecting with its head shaft. Operation may be automatic by means of a time clock, or manual via pushbuttons.

Advantages of new screen are: (1) Minimum floor space required because screen bars are mounted vertically. (2) Jamming of floating material clogging bars is practically eliminated, as rake teeth travel upward through openings between bars from downstream side of machine. (3) Rakes start upward from lowest portion of channel below any of material to be removed. (4) Power consumption and wear are kept down by minimum friction between rakes and the vertical screen bars. (5) Maintenance of proper chain tension is made easy by having chain take-ups on head shaft, where they are readily accessible. (6) Ample overhead protection is provided by breaking pin hub, or by use of electrofluid drive.—*Link Belt Co.*, 307 *N. Michigan Ave., Chicago* 1.

Motor Sleeve Bearings Easily Replaced

Worn sleeve bearings can now be removed from motor endplates, and new bearings inserted in one operation with a new tool.

Tool consists of a steel rod, accurately finished to accommodate precision bored bearings on one end, and unbored bearings (for undersized shafts) on the other. A central shoulder separates the two ends.

New bearing is slipped on the rod, its unchamfered end against the shoulder of the tool. Spacer, furnished with the tool, is slipped on with its unchamfered end against the new bearing. The end of the tool is then inserted into the old bearing, from the inner side of the endplate.

The new bearing is positioned on the tool so that its oil wick hole lines up with the hole in the old bearing. Then a press or rawhide mallet is used to drive the tool until its shoulder seats against the endplate. The spacer forces out the old bearing. And the new bearing, as it is pushed into proper position, forces out the spacer.

The old bearing acts as a pilot, assuring correct alignment of the new bearing without reaming.

Bearing tool is available in four sizes, for motors with finished bearing sizes of 0.655, 0.751, 0.812, and 1.062 in.—*Wagner Electric Corp., 6489 Plymouth Ave., St. Louis 14.*

Vacuum Gage Fills Gap

With a working range of .05 to 50 mm., this new vacuum gage fills the gap between low range gages and dial type measuring instruments. It is easily and quickly operated for rapid readings. Lightweight and portable, gage weighs 6½ lb., measures 7½ x 12 x 4½ in.—*F. J. Stokes Machine Co., 5900 Tabor Rd., Phila., 20, Pa.*

(Food Equipment Continued)

PROTECTION AND Beauty

AFRICAN ELEPHANT *

MUTE SWAN **

KVP PAPERS

For The FOOD INDUSTRY

The primary job of any paper used to wrap foods or line boxes and cartons is to protect its contents from dirt, rough handling, loss in color, flavor or weight. On the success of this protection rests the food processor's reputation . . . and profits.

Thousands of food processors in the United States look to KVP, with its dozens of highly specialized papers, to provide this security.

They also look to KVP artists and printers to provide attractive, sales-compelling designs and printing.

Protection and beauty, all in one package . . . that is the KVP story.

INDUSTRIES SERVED

BAKING
Bread - Cracker
Cereal

MEAT
Packing - Locker
Retail

DAIRY
Butter - Cream - Cheese
Ice Cream - Milk

FISH - FRUIT - FROZEN FOODS
POULTRY - SHORTENING
VEGETABLE

*No one except maybe another elephant ever accused old *Loxodonta africana* of being beautiful. But his great size and strength make him a symbol of power and protection.

**The mute swan, *Cygnus olor*, is no slouch when it comes to protecting his nest and young, but his chief asset is his well deserved fame for grace and beauty.

Kalamazoo Vegetable Parchment Company

PARCHMENT · MICHIGAN

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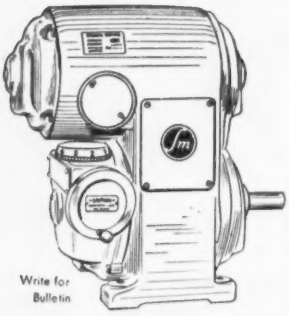
APPLEFORD PAPER PRODUCTS LIMITED, HAMILTON, ONTARIO - MONTREAL, QUEBEC

Uncork
Bottle-necks



Open up production bottlenecks with Sterling Speed-Trol Electric Power Drives.

STERLING
ELECTRIC MOTORS

Write for Bulletin

Plants: New York • Los Angeles • Hamilton, Canada
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SPEED-TROL (Variable Speed) • SLO-SPEED (Geared) • KLOSED (Normal Speed)

Can't
• CREEP
• WEAVE
• JUMP

The continuous, uniform speed, perfectly flat surface, open mesh feature and resistance to acid, heat and cold make La Porte Conveyor Belting adaptable to every process in food manufacture—plus packaging and shipping.

In addition, it is the most sanitary conveyor belting available—easily and quickly sterilized with steam or scalding water, without removal from friction drum. Furthermore, it is built to last.

You can save money with La Porte Flexible Steel Belting. It is available in any length and practically any width. Write your dealer at once for literature and prices.

LA PORTE MAT & MFG. CO.
BOX 124 LA PORTE, INDIANA

Nylon Lasts Longer

Brushes made of nylon can be used four times as long as those made from bristles, on all surfaces, it is claimed, including concrete, brick and structural steel. New filaments are stated not to split, fray or become brittle. The brushes can be used with all types of paints.—*Industrial Div., Fuller Brush Co., 3635 Main St., Hartford, Conn.*

Equipment Briefs

Small Steam Cleaner

Designed to meet the needs of small industrial plants, a high pressure steam cleaner, incorporating features of larger units has been developed. Requiring only 27 x 37 in. of floor space, unit develops 80 to 120 lb. working pressure. Normal 45 gph. can be stepped up to 240 gph. by simple accessory.—*Homestead Valve Mfg. Co., Coraopolis, Pa.*

Filter Housing

For use where dust filters must be installed outdoors, and also on vacuum installations, a housing for the "Auto-clean" dust filter is now being marketed. Quick-opening clamps make erection fast and simple, and they permit fast removal of sections for easy access to filter.—*The Day Co., 810 Third Ave., N. E. Minneapolis 13.*

Recording Instrument Pen

For use on circular-chart electronic potentiometers a new recording instrument pen avoids ink-throwing while producing speedy recording. Company engineers term pen essential for thermal recording in continuous pasteurizing processes.—*Brown Instruments Div., Minneapolis-Honeywell Regulator Co., 4502 Wayne Ave., Phila., Pa.*

Heat Sealing Iron

Desired temperatures of a new heat sealing iron are controlled by a selector dial on a thermostat mounted close to the heating surface. Thermostat reacts to temperature changes as little as 3 deg.—*Miller Wrapping & Sealing Machine Co., 15 S. Clinton St., Chicago 6.*

Evaporative Condensers

Fiberglas eliminator sections are standard construction in a line of evaporative condensers of 10 to 40 ton capacity. Water droplets are removed by the Fiberglas to prevent corrosion in fan section.—*Bush Mfg. Co., Hartford, Conn.*

—*End*

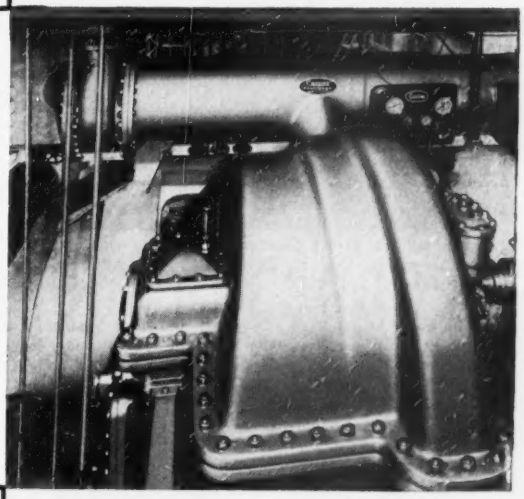
AT GEO. A. HORMEL & CO.—

Power for refrigeration costs practically nothing

10 major points of superiority of the Carrier Centrifugal Refrigerating Machines:

1. **Low operating cost**
2. **Space-saving**
3. **No vibration**
4. **Minimum maintenance**
5. **Simplified operation**
6. **Dependability**
7. **High sustained efficiency**
8. **Safety**
9. **Adaptable to any type of drive**
10. **High partial load performance**

The Geo. A. Hormel & Co. plant at Austin, Minn., increased its refrigeration capacity by installing a Carrier Centrifugal Refrigerating Machine in parallel with existing ammonia reciprocating compressors. The Centrifugal Compressor is driven by a back-pressure steam turbine which exhausts steam for heating and plant operations. Using this setup power for refrigeration costs practically nothing.



Carrier

AIR CONDITIONING
REFRIGERATION
INDUSTRIAL HEATING

If you have refrigeration problems, Carrier can serve you with the most extensive line of refrigeration equipment in the industry: centrifugal refrigeration for brine cooling or ammonia condensing, reciprocating compressors for ammonia, absorption refrigeration using safe refrigerants, cold diffusers, and evaporative condensers—all built in the Carrier tradition of leadership. Carrier Corporation, Syracuse, New York.

New Packages and Products

Decanter Holds Ice Without Diluting

An ingenious wine decanter is being used by Monarch Wine Co., Brooklyn, New York, to distribute its Manischewitz brand of wines. The novel container has been designed with a deeply inset pocket big enough to hold eight ice cubes. Thus, the beverage can be chilled without being diluted and there is no need for a separate ice bucket.

The bottle is imported from Italy and is of hand-blown glass. Placed in a raffia holder and with pouring spout and filling neck stoppered with the same bright material, it makes a very attractive package. Container holds ½ gal. of wine. It is currently available with the company's Malaga, Concord or Sweet Grape wine.

Firm originally introduced the vessel as a trial novelty, but it proved so popular that within a short time the demand outpaced supply. Distribution is nationwide.

White Sauce Can Now Be Made In A Jiffy

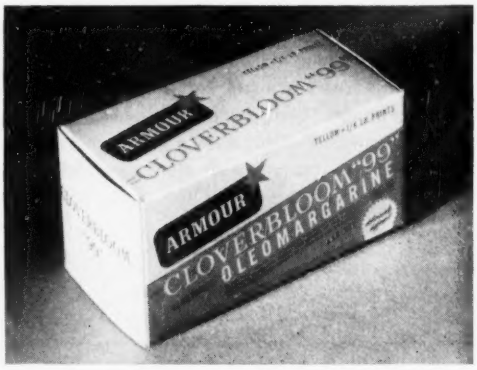
To make cream sauce quickly, just break off a bar of this new product, put it into a saucepan with a cup of milk, then stir briskly over a medium fire until melted, adding salt to taste. And that's all there is to it—the sauce is ready to serve.

Housewives can thank the manufacturer, Saucery, Southampton, Long Island, N. Y., for this cookery short cut.

This unusual item is merchandised in an attractive green and white box holding six bars of the solid mixture wrapped in cellophane. Net weight is 6 oz. It is composed of wheat flour, vegetable shortening, lecithin, nonfat dry milk and artificial flavor.

Directions on the back of the package tell how to make the sauce in 2 min. Also, uses are suggested in gravies, soups, stews, and various flavored mixtures. Cooks will find many suitable recipes listed here.

Development of this novel product came about accidentally. While in the process of making some white sauce in her kitchen, Mrs. J. V. Tarleton, of the company, put some of the unfinished material into the refrigerator. Finding it later in the solid form, she simply heated it with some milk and found it excellent. This led to the business of producing it on a large scale. And since acceptance in the New York City markets has been enthusiastic, distribution of the sauce-bars will now be extended to other areas in the country.



Oleo With a Butter-Like Character

As a food fat to compete with butter and oleomargarine, Armour & Company is producing Cloverbloom "99." This new item is made by a patented method of mixing milk and vegetable oils. The combination is churned to produce a spread said to have all the taste, texture and nutritional characteristics of sweet cream butter.

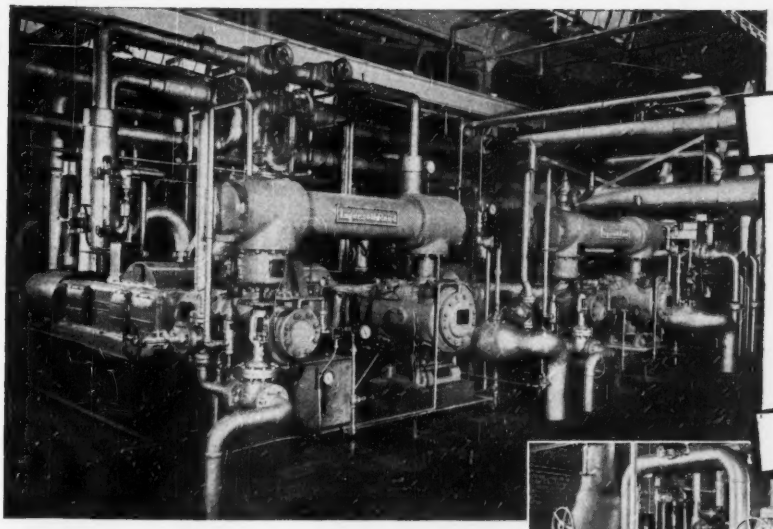
Under existing federal laws and regulations, "99" will classify as margarine and the containers will identify it as such. It will be sold in the yellow form and also the white with materials for coloring included.

Package is attractively printed in yellow, blue, white and brown. The colored product is offered in ¼ lb. prints.

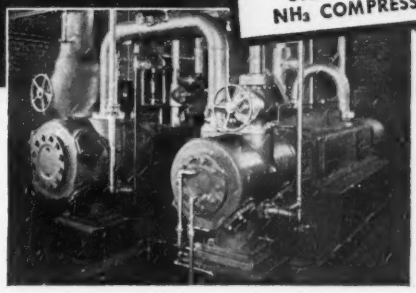
V. L. Turgasen, production manager of the firm's dairy and poultry division is credited with creating the new product.

An Armour plant in Ft. Worth has been equipped to churn the spread and sales are being initially tested in Texas. When consumer acceptance is demonstrated, additional manufacturing facilities and sales territories will be established.

(Packages and Products Cont'd)



STEAM-DRIVEN CO_2 COMPRESSORS



STEAM-DRIVEN NH_3 COMPRESSOR

At New "DRY-ICE" Plant

PURE CARBONIC
INCORPORATED

Depends on IR COMPRESSORS

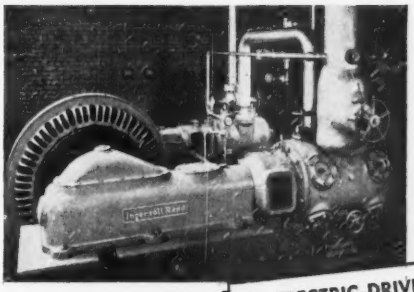
Seven Ingersoll-Rand compressors totalling 1450 hp, in the new Chicago carbon-dioxide plant of Pure Carbonic, Incorporated, help produce 150 tons of "DRY-ICE" daily... for food industries and manufacturers of resins, paints, rubber, plastics, ceramics, pharmaceuticals, petroleum products, and fire extinguishers.

Four 200-hp compressors handle CO_2 gas, compressing it from 35 to 360 psi. These are the well-known Ingersoll-Rand Type XPV steam-engine-driven compressors noted for their simplicity, adaptability to varying conditions, economy, and smooth operation in process service.

One of the ammonia-refrigeration compressors is of the same steam-driven type. The other two, 150 hp each, are of heavy-duty, double-acting, synchronous-motor-driven design.

During the 40 years it has been producing carbon dioxide, Pure Carbonic, Incorporated, has installed Ingersoll-Rand compressors in several of its other plants.

Ingersoll-Rand has had long experience in designing and building process compressors for practically all pressures and all kinds of gases in sizes up to 3000 hp. Qualified compressor specialists are located in I-R offices all over the world. Call upon this experience when you need help in solving a problem of air or gas compression.



ELECTRIC-DRIVEN NH_3 COMPRESSOR

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 457-1

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL AND GAS ENGINES

NEW BAUSCH & LOMB *Juice* REFRACTOMETER

USES *BOTH* TRANSMITTED AND REFLECTED LIGHT

For the first time, a hand refractometer is now available that uses either reflected or transmitted light—transmitted light for clear, transparent solutions . . . reflected light for dense, opaque or turbid samples.

FOR QUICK, ACCURATE ANALYSIS of citrus or vegetable juices . . . for easy on-the-spot checking in the plant or in the field . . . the new Bausch & Lomb Juice Refractometer is an ideal instrument.

DIRECT READING with no interpolation necessary. A precise scale, from 0 to 25% total solids, provides for readings made directly with high accuracy. Scale lines alternate on each side of the center line, even tenths on one side, odd tenths on the other . . . avoiding a crowded scale.

WELL-DEFINED, COLORLESS DIVIDING LINE assures accurate readings, speed and convenience. Angles of prism faces, and the selective compensating filter make the dividing line sharp. Self-seating cover prevents damage to prisms.

FOCUSING EYEPIECE adjusts to accommodate individual user's eyes. Combined with an easy-to-read internal scale, this helps eliminate guesswork in routine refractometric observation. Wide aperture gives complete unobstructed view of entire scale and borderline.

WRITE for complete information and demonstration of the new B&L Juice Refractometer. Bausch & Lomb Optical Co., 603-M St. Paul St., Rochester 2, N. Y.

BAUSCH & LOMB *Juice* REFRACTOMETER

Home-Size Frozen Fillets

"Chillets"—choice fillets of sole—are now being packaged in home-size 1-lb. cartons under the Belleanna brand by New England Fish Co., Seattle.

Previously, the fish was packed only in 5 and 10 lb. sizes. This new container is designed to have more sales appeal and to fit in the ice tray of home refrigerators. Body of the 2⅞-in.-wide by 9½-in.-long package is a butter color with a photo of the prepared fish in a brown tone. Lettering is in blue and red.

Recipes and directions for storing and defrosting are given on the sides and back panel of the wrap.

Package was designed by James Allen of Pacific National Advertising Agency, Seattle.

Size and economy features of the little loaf are particularly attractive to apartment house dwellers. And it appears to be winning a new group of customers for the bakers—as evidenced by the fact that sales of the larger loaves have not fallen off.

Bread for Small Families

Cellophane wrapped, a new, small-sized loaf of white bread having 14 full-size slices is the newest development of Arnold Bakers, Inc., Port Chester, N. Y.

This "small family" loaf was first test-marketed in selected areas of New York City, and having met with immediate success, it is now being distributed throughout the metropolitan area. Later, marketing will be extended to other localities.

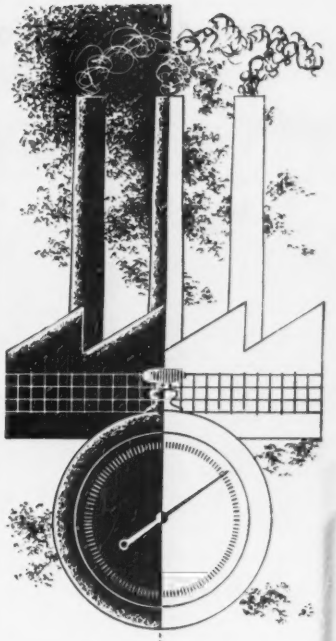
Re-Usable Hermetic Seal

To prevent food spoilage from moisture or air, there has been introduced a hermetically sealing metal closure that can be readily opened and then re-sealed just as easily.

Manufactured by Jansen Container Co., Chicago, under the tradename Magneseal Cap, this novel device requires no can openers or keys and can be re-used many times in numerous ways. It can be employed, with automatic capping equipment, on glass, tin or fiber containers in all popular sizes.

Use is simple: Slip the inner cap over the container opening (see

(Packages and Products Cont'd)



how fast plant **clean-up?**

Metso Cleaner keeps your daily clean-up on schedule because it is a speedy dirt remover. Metso quickly breaks down the films of protein, fats or oils, and suspends the dirt until floated away.

Metso Cleaner is a scientifically balanced combination of alkali and silica. The soluble silica component increases detergent action and also curbs corrosion of sensitive metals.

Use Metso in your plant and be sure.

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1148 Public Ledger Bldg., Phila. 6, Pa.

daily clean-up is **easier thorough on schedule**

METSO

metso *cleaners*

Press breaks down — but $2.88 keeps editions rolling

Press broke down at 5 P.M., at end of evening edition's run. But this publisher got replacement parts in a hurry the same way he gets electros, mats, news photos —by Air Express. An 18-lb. carton traveled 500 miles, was delivered by 11 P.M. Shipping charge $2.88. Morning edition published as usual.

Air Express is the best air shipping buy to keep any business rolling, since low rates include door-to-door service. Answers your problems because Air Express is *fastest* and *most convenient*.

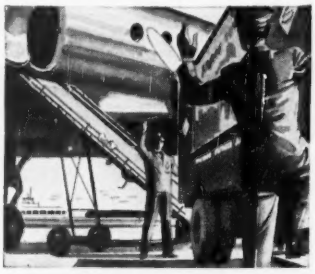

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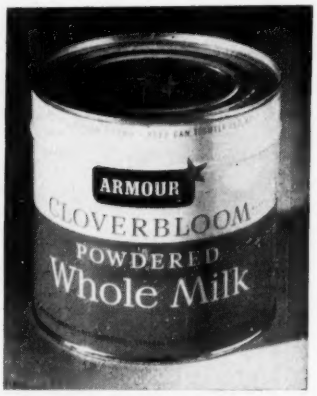
photo), then press down the outer ring over the inner cap. To open, just reverse the procedure by prying off the outer rim, pressing down on the center of the closure to release the tension, and then lifting the lid.



New Can of Dried Milk

Powdered whole milk, packaged in 1, 2½ and 5 lb. tins under the Cloverbloom label, has been announced by Armour & Company.

Can is colored in characteristic blue and white with the Armour trademark standing out against a brown background. Contents of the 1 lb. container are equal to about 1 gal. of liquid whole milk. Approximate analysis shows the percentage composition to be: Butterfat 28.0; lactose 37.7; protein 26.7; ash 5.6 and water 2.0.

Instructions for reconstituting the dry powder are listed on the label in English, French, and Portuguese.

Frozen Cranberry Juice

Into the New York and New England market areas has recently come Ocean Spray fresh-frozen cranberry juice. It is marketed in the regular 6 oz. can. Contents mixed with two parts of water will make 1 pt. of the ready-to-serve juice, replete with the natural flavor and brilliant color.

Product is made from vine-ripened cranberries with sugar added. The maker's advertising states the juice is "healthful because it contains 13 minerals and vitamins; wealthful because of being rich in food value; and wise to be drunk before meals as an aid to digestion." There is available a recipe booklet suggesting ways of using the frozen food in desserts, salads, and fruit drinks.

(Packages and Products Cont'd)

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Most important to you, Continental is a service organization. We have both the research facilities to meet your technical problems and the manufacturing capacity to assure you of a dependable source of supply.

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You can't beat Continental as a dependable source of supply!

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Waterous MAKES IT . . .
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NO INTERNAL THREADS OR SEALS—contamination eliminated! WATEROUS meets all 3A Sanitary Standards.
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If it's a 100% Sanitary Pump—it's a Waterous
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For Blending or Proportioning Food Mixes
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DRY FEEDERS
The OMEGA BELT TYPE GRAVIMETRIC FEEDER, designed for dependable weighing and feeding of dry materials, handles either fine or coarse ingredients. It feeds continuously and automatically with an accuracy of 99% or better. The OMEGA Gravimetric Feeder is ideal for continuous or batch blending and proportioning of dry mix food products . . . such as sugar, flour, salt, cocoa, beatrene, powdered milk, magnesium carbonate, and leavening mixes. Write for Bulletin.
OMEGA MACHINE COMPANY
(Division of Builders Iron Foundry)
84 Codding Street, Providence 1, R. I.

Dutch Cupboard Spice Set

Twelve related spices are offered by Spice Island Co., San Francisco, in a cardboard cupboard which doubles as a reusable kitchen accessory.

Called the Dutch Cupboard, the package is made of woodgrain paper laminated to paste board. Decorative designs carry out the Dutch theme.

The large, window-box cover, with cleverly shaped panels of Lumarith film gives a full view of the contents and, besides, adds a gift-look.

Box base (see photo) is fitted to hold four bottles on the lower shelf and eight smaller spice jars on the upper. The bottom is reinforced with a filler or collar to support the weight of the glass bottles.

Fleishhacker Paper Box Co., San Francisco, supplies the boxes and Celanese Corp. of America, New York, manufactures the film.

Briny Deep "Hot Dawgs"

New England residents will soon be treated to a new delicacy coming from their deep blue seas. For many of the huge tunas caught off the northeast coast last year are destined to appear in local eating spots cloaked in buns like the familiar frankfurters.

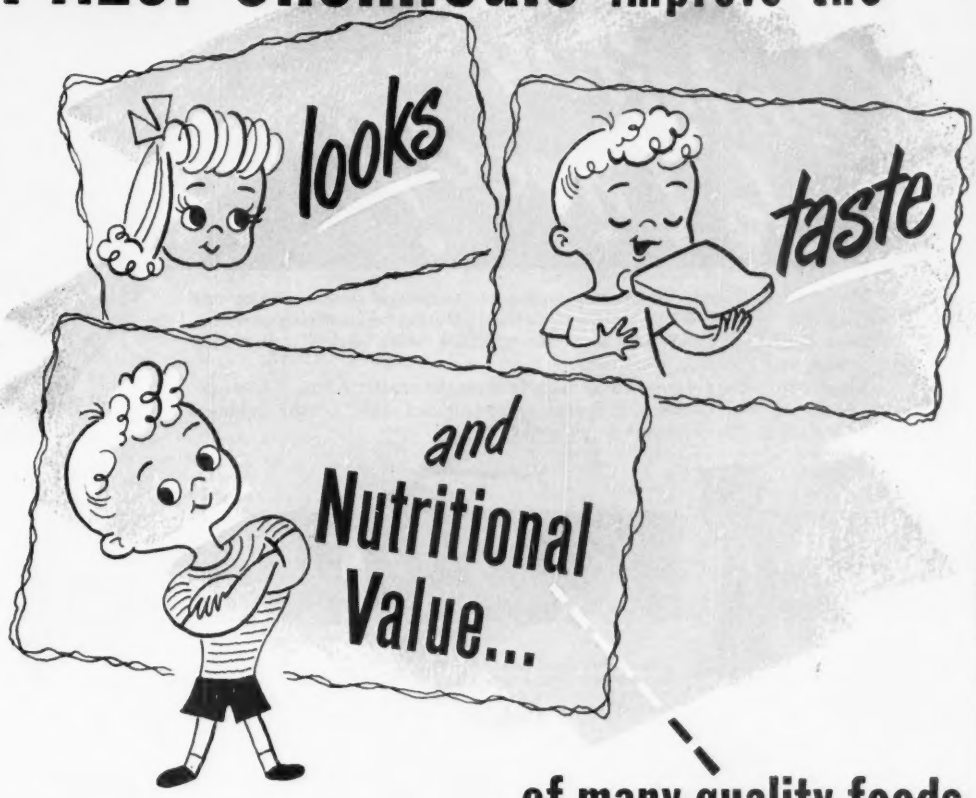
Plans made by Davis Brothers Fisheries Co., Gloucester, Mass., call for setting up complete facilities to process the fish into the new hot dog form. Company is one of the largest purchasers of eastern tuna.

Coffee-Milk Drink On Way

A new kind of milk drink known as "Kofy-O-Lay" is expected to be introduced shortly in Chattanooga, Tenn. The beverage was reportedly produced by the Industrial Research Institute of the University of Chattanooga as part of a project in developing a coffee extract.

—End

Pfizer Chemicals improve the



of many quality foods

• Appetizing appearance sparks the initial sale. The smooth velvety texture of many processed cheeses is a direct result of the efficient emulsifying action of Pfizer Sodium Citrate or Sodium Gluconate.

The remembrance of delicious taste reaps many a repeat sale. Pfizer Citric and Tartaric Acids add a tongue-tingling tartness to jams, jellies and preserves that just balances the sweetness of sugar and enhances fruit flavor.

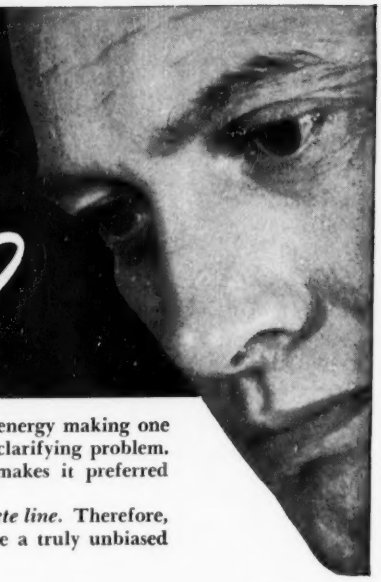
Nutrition-conscious Mrs. America shops increasingly for health-building foods. To meet her demands, remember Pfizer as a major source of the dietary — essential vitamins. For further details on Pfizer Chemicals for the Food Industry please write: Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N. Y.; 425 North Michigan Avenue, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

PFIZER QUALITY®

PFIZER

Manufacturing Chemists Since 1849

Which Centrifuge do I need?



There are differences in the application of centrifugal energy making one centrifuge the best answer to your particular separating or clarifying problem.

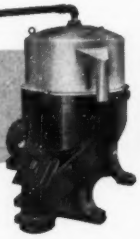
Each centrifuge below has a specific function which makes it preferred over others under certain conditions.

The Sharples Corporation alone manufactures *the complete line.* Therefore, after analyzing your problem, a Sharples engineer can make a truly unbiased recommendation. He is always at your call.

SUPER-CENTRIFUGE

A tubular bowl centrifuge which develops the highest centrifugal force commercially available. Can separate immiscible liquids with extremely small differences in specific gravity.

D-2-CENTRIFUGE

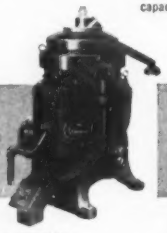


A disc-type centrifuge employing the stratification principle of high separating efficiency combined with high through-put capacity.

NOZLJECTOR

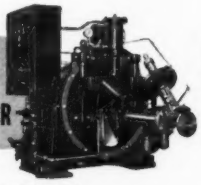
A high efficiency disc-type centrifuge that continuously discharges solids as well as performing the clarifying or separating function.

AUTOJECTOR



This disc-type clarifying or separating centrifuge intermittently and automatically discharges solids when a pre-determined "cake" has been built up.

SUPER-D-HYDRATOR



Used for the recovery of crystalline solids from liquids, this high capacity centrifuge can efficiently handle slurries with 15 to 60% solids.

SUPER-D-CANTER

A high capacity centrifuge used for the recovery of solids from liquids, the clarification of liquids or the classification of solids. Capable of handling a wide variety of solids.

The
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Sharples

New Technology

Non-Enzymatic Browning of Foodstuffs Accompanied by CO_2 Generation

Sugar-amino acid reactions (melanoidin or Maillard reaction) are a major cause of non-enzymatic darkening of many foods. By sealing weighed portions in glass tubes in an atmosphere of nitrogen, it has now been found that the darkening is accompanied by a release of CO_2. Incubation at 100 deg. C. accelerates the production of CO_2. However, the gas is also produced when sterilized material is incubated at 50 deg. C. Prunes developed the most gas, 12.41 mg. per g. in 7 days at 100 deg. C., but black currant jam, fresh French beans, and orange juice also produced appreciable quantities. Similar gas evolution and darkening were obtained with solutions of glycine and glucose.

A black pigment, soluble in water to give a reddish brown solution when concentrated, or a yellow solution when dilute, was isolated from a glucose-glycine reaction mixture, by passing it through a chromatographic column of alumina. The pigment was not adsorbed by the alumina. On purification it was found to have maximum absorption of light at a wave-length of 400 millimicrons, and the absorption of light of this wave-length is a satisfactory measure of the amount of decarboxylation of the amino acids and darkening due to the Maillard reaction.

Complete Decarboxylation

Production of CO_2 was also studied with several amino acids (glycine, aspartic acid, cystine, asparagine, *p*-aminobenzoic acid and propionic acid) in different concentrations to find the quantitative relation between CO_2 produced and amino acid destroyed. One ml. of amino acid solution was sealed in a tube with 1 ml. 20 percent glucose solution in an atmosphere of N_2, and incubated for 1 month at 100 C. In most instances, actual results agreed closely with expected results.

Nitrogen-free carboxylic acids also react with glucose to release CO_2 and darken the mixtures containing them, the effect increasing with pH value. Citrates produced the most color, lactates the most CO_2. Oxygen, in the head space of the tubes containing the reaction mixture, increased the darkening and also modified the absorption spectra, indicating that the oxygen effected the formation of slightly different compounds from those formed in its absence. SO_2, in the absence of oxygen, prevented color formation at the lower pH values except when citrates were present; when oxygen was present, SO_2 did not inhibit color formation. The color produced by the non-amino carboxylic acids is of the same order of intensity as that produced with amino acids. Since the former are found in foodstuffs to a far greater extent than the latter, their effect on non-enzymatic browning may be an important one.

Digest from "Nonenzymatic Browning of Foodstuffs Production of Carbon Dioxide" and "(Nonenzymatic Browning of Foodstuffs) Nitrogen-Free Carboxylic Acids in the Browning Reaction" by V. M. Lewis, W. B. Esselen Jr. and C. R. Fellers, *Industrial & Engineering Chemistry*, Vol. 41, No. 11, 2587–94, Nov. 1949.

FREEZING

Treatment Prevents Browning Of Thawed Frozen Foods

Although the browning of thawed frozen fruits, such as apricots, nectarines, and peaches, can be prevented by treatment with a sulphite solution or with ascorbic acid, both methods have substantial drawbacks. Sulphite often gives the fruit an undesirable taste, and ascorbic acid must be used in large quantities.

According to a patented process, it has been found that, when the fruit is treated with a sulphiting agent, ascorbic acid, and an inorganic chloride, such as common salt, browning is prevented. And only small quantities of sulphite and ascorbic acid are needed. A typical mixture contains 1 percent salt, 0.5 percent ascorbic acid, and 500 ppm. SO_2 added as sodium bisulphite. Sliced peaches held in a bath of the mixture for 2 min., drained, packaged, frozen at minus 10 F., and stored under refrigeration for 2-3 months, showed no browning after being exposed to air for 7 hr.

Digest from U. S. Patent 2,475,838, issued July 12, 1949, on an application dated Oct. 3, 1947, to G. Johnson, Ft. Collins, Colo., and D. G. Guadagni, Albany, Calif., assigned to the U. S. A.

Precooked Frozen Foods Have Many Bacteria

Frozen chicken a la king yields bacterial counts in excess of what reasonable standards would allow, and it seems likely that the contamination occurs prior to freezing.

These are the conclusions resulting from a study carried out by members of the New York City Dept. of Health to determine if potential health hazards exist in frozen precooked foods. Other products tested were: Creamed meats, creamed fish, other meat, fish and chicken products, and soups.

More than half of the 39 samples of frozen chicken a la king yielded plate counts in excess of 1,000,000 per g., and 38.5 percent yielded coliform counts greater than 100. Twelve of the samples yielded staphylococci of the food-poisoning type.

For comparison, there were obtained samples of chicken a la king as served in restaurants in the city—20 samples from 18 restaurants. No sample yielded a plate count greater than 10,000, and no coliforms were found. This seems to indicate that the problem is one of sanitation which must be solved by the processors in their own plants.

Most of the other frozen precooked products were, by comparison with chicken a la king, superior products. Nevertheless, the bacteriological status of chicken patties and miscellaneous chicken products is such as to raise doubts as to their sanitary quality. And the fact that 7 percent of the samples of other frozen precooked products had counts greater than

(New Technology Continued)

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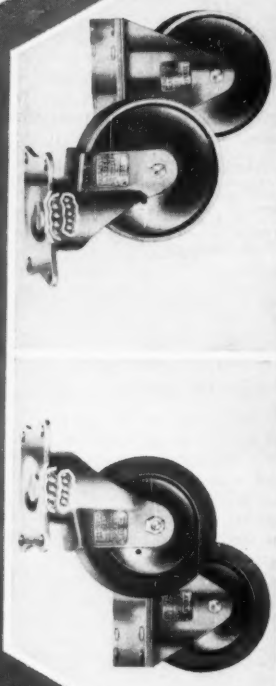
A SAVING AT EVERY TURN

DARNELL CASTERS



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1,000,000 per g. should not be conducive to the complete peace of mind of processors, distributors, and enforcement officers.

Digest from "A Survey of Frozen Precooked Foods With Special Reference to Chicken A La King," by L. Buchbinder, V. Loughlin, M. Walter and G. Dangler, *Journal of Milk and Food Technology*, 209-13, July-Aug. 1949.

BAKING

Temperature of Storage Affects Yeast Viability

Experimental studies on the storage of active dried bakers' yeast covered the following factors: Containers, atmosphere within the containers, light, and time and temperature of storage. Examination of the analytical data shows that packaging atmosphere—air, N, CO_2, O, and partial vacuum—had little effect on the viability of the stored yeast. However, all samples, regardless of package or atmosphere, showed 10—20 percent lower viability than the control; and all samples stored at —20C. showed 10—20 percent higher viability than samples stored at 5C. in air. Study of atmosphere changes within a stored can showed that active dried yeast continued to respire in storage. Preliminary studies showed that higher humidities are harmful to the viability of stored dried yeast. Temperature was found to have the greatest influence, with little effect due to light, packaging material, and atmosphere.

Digest from "Storage Studies On Active Dried Bakers' Yeast," by R. E. Morse and C. R. Fellers, *Food Technology*, Vol. 3, 234-36, July 1949.

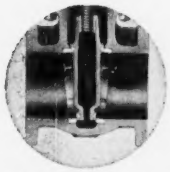
VITAMINS

Vitamins and Oil From Rice Bran

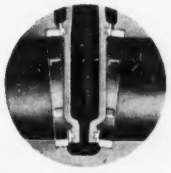
Rice bran, which contains from 12 to 20 percent oil and substantial quantities of most of the B-vitamins, is subject to rapid deterioration after milling on account of its finely divided condition and enzyme activity in splitting the fats. The oil also becomes rancid and makes the product unpalatable as a feed, in addition to producing soft pork when fed to swine. Experiments were undertaken to eliminate these undesirable properties by simultaneous extraction of both vitamins and oil from the bran immediately after milling, using isopropanol as the solvent.

After the miscella was evaporated the concentrate formed three layers, one of oil, one of syrup containing the vitamins, and one of a wax-like solid,

(New Technology Continued)

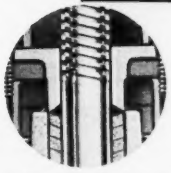


Straight-Flow Port Design reduces fluid turbulence to a practical minimum.



Seat Rings of end-seated type are screwed into the body.

Sure-Grip Malleable Handwheel for non-skid gripping even with heavy gloves.



Brass Liner on Glands assures greater resistance to corrosion and scoring.

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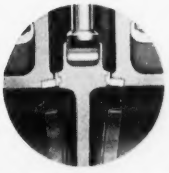
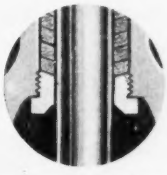
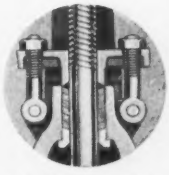


T-head Disc-to-Stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.



Bronze Back-Seat Bushings in bonnets of OS&Y valves.

Solid Web Type Disc in OS&Y valves for greater strength and longer service.



Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

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which were carefully separated. The solvent still remaining in the oil was removed by water washing. The syrup was diluted with water, again evaporated, and filtered in a basket centrifuge. Yields per 100 lb. original bran were: Extracted bran, 77.5 lb.; oil, 16.6 lb., and syrup, 10.6 lb. Eight of the B-vitamins were determined microbiologically in the original bran, extracted bran, and syrup concentrate. Results indicated the feasibility of recovering substantial quantities of the vitamins by using 91 percent isopropanol as the solvent. Inasmuch as both hexane and isopropanol are efficient solvents for the oil, the choice of solvent would depend on the value of the products to be obtained—hexane if oil only is desired, isopropanol if both oil and vitamins are to be recovered. The extracted brans prepared in these experiments seem to have good storage qualities and are now being used in feeding tests.

Digest from "Solvent Extraction of Rice Bran. Production of B-Vitamin Concentrate and Oil by Isopropanol Extraction," by W. W. Meinke, B. R. Holland and W. D. Harris, *Journal of the American Oil Chemists' Society*, Vol. 26, 532–34, Oct. 1949.

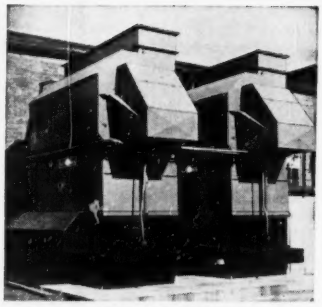
FATS AND OILS

Many Factors Affect Potato Chip Quality

Two years' results are embodied in a report on the laboratory production of potato chips from different varieties of potatoes cooked in oils. Color rating, yield, and oil content of chips were determined for each of 6 varieties of tuber cooked in corn, cottonseed, and peanut oils, and hydrogenated shortening. Other factors investigated were the effects on yield and absorption specific gravity of potatoes and (2) temperature of cooking oil. Tabulated results must be consulted for details of the behavior of named varieties of potatoes, but certain general conclusions can be presented here.

Although there was a relationship between yield and oil content of chips, there was no apparent correlation between color of chips and either yield or oil content. Two varieties, Irish Cobbler and Katahdin, were rated low in desirable color, while the Chippewa variety was low from the standpoint of yield. Chippewa and Sebago chips were high in oil content. Oil absorption by the chips increased with a decrease of cooking oil temperature. All of the oils were of equal desirability as to color and yield of chips, but corn oil was absorbed to a greater extent

(New Technology Continued)



NIAGARA AEROPASS CONDENSER (Patented)

Saves Half the Engineer's Troubles with a Refrigeration Plant

Hundreds of engineers have been interviewed about their experience with the Niagara Aeropass Condenser. In one way or another, they say, "I wouldn't go back to anything else." And their managers, who watch the costs, say, "Best investment we ever made, couldn't operate now, without it."

Niagara Aeropass Condensers have three exclusive features which save trouble and money in running a refrigeration plant:

The "Duo-Pass"— keeps scale and salts from crusting the coils, keeps the condenser always at full capacity.

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The "Balanced-Wet-Bulb" control which gives you automatic operation at the minimum head pressure, saving power cost the year 'round!

In addition, the Niagara Aeropass Condenser saves nearly all your cost of cooling water, quickly bringing back to you the cost of installation. In plants where refrigeration is a production process, owners know that this condenser has reduced their costs.

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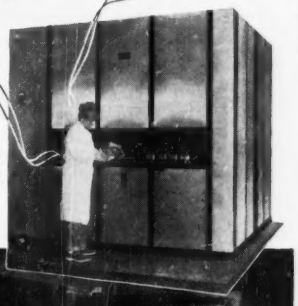

Gas-fired Advance revolving tray oven used for baking meat.

Loading the racks in one Gas-fired revolving wiener smokehouse.

Checking picnic hams during curing process in multi-story smokehouses. Lipton smoke unit and heater are Gas-fired.

QUALITY COOKING is not the usual way to describe heat-processing in the meat packing industry. But, Fried & Reineman Packing Company controls its cooking operations just as carefully as the expert homemaker or master chef.

Under its FORT PITT trademark, this fifty-three year old Pittsburgh packer markets more than seventy varieties of sausages and loaf-meats, as well as bacon, ham, and other products. Most of these meat products are smoked, cooked, or baked under quality controlled standards in modern ovens and smokehouses using GAS both for cooking and for smoke-generating.

In commenting on the wide use of GAS in the Fried & Reineman plant, the management emphasized, **"Accurate temperatures, automatically maintained, are essential to our processing. In baking, we use the slow-heat method to hold the juices and flavor in the meat. Smoking, too, requires a variety of temperatures for our wide range of products and, in all our smokehouses, GAS gives us the precise control for every need."**

Throughout the packing industry GAS performs countless heat-processing functions on a production-line basis. In fact, the versatility of GAS and the flexibility of Gas Equipment have been demonstrated throughout the food industry, wherever heat is used for processing. From an economy standpoint alone, you should investigate GAS today. Your Gas Company Representative is always ready to help.

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THE TREND IS TO GAS
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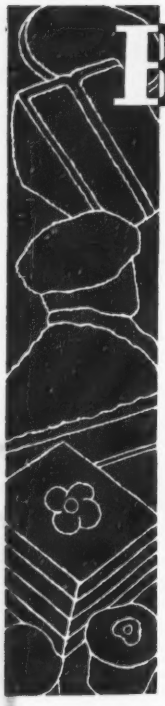

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In our Flavor Research Laboratories, the baker's flavoring problems, like those of other important segments of the food industry, have long been the subject of studied research. Some of today's most widely used flavors—cake, butter, spice and pie-filling specialties—are the result of this unceasing effort to achieve finer taste effects more economically. Our catalog of flavoring specialties will interest you.

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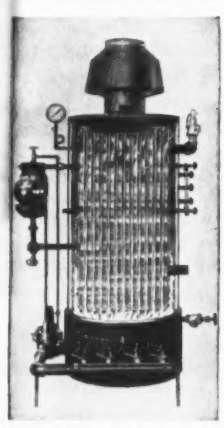

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Engineered Steam at its best with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.

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FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE

than any of the others. Tubers of high specific gravity gave a higher yield of chips with lower oil absorption than did those of lower specific gravity.

Digest from "Effects of Variety, Specific Gravity of Tubers, and Cooking Fat on the Quality and Yield of Potato Chips," by T. M. Whiteman and R. C. Wright, *The Potato Chipper*, Published by The National Potato Chip Institute, 1360 Hanna Bldg., Cleveland 13.

PACKAGING

New Frozen-Food Package Prevents Freezer Burn

Some foods, particularly fowl and other carcasses of irregular shape, often undergo freezer burn when stored in a frozen condition, usually at those areas of the surface that are necessarily out of contact with the protective wrapper.

A recent patent discloses a method of packaging that will substantially eliminate this condition. The fowl or other carcass is placed in a water-tight, thin-walled bag of suitable size. The bag is then filled with water and the air is allowed, or caused, to escape from the cavities or irregularities in the contour of the carcass. The mouth of the bag is closed below the water level, and the whole inverted to permit water to drain slowly without admitting air. This draws the bag into close contact with the surface of the object, after which the mouth is sealed.

All cavities or irregularities which would normally be air pockets are now filled with water, and the bag fits snugly around the contents. The bag may be any flexible material capable of holding water.

Digest from U. S. Patent 2,480,082, issued Aug. 23, 1949, on an application dated Oct. 1, 1947, to R. D. Lowry and C. R. Irons, Midland, Mich., assigned to The Dow Chemical Co., Midland, Mich.

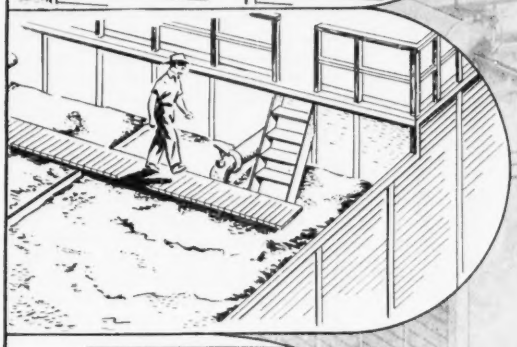
DAIRY

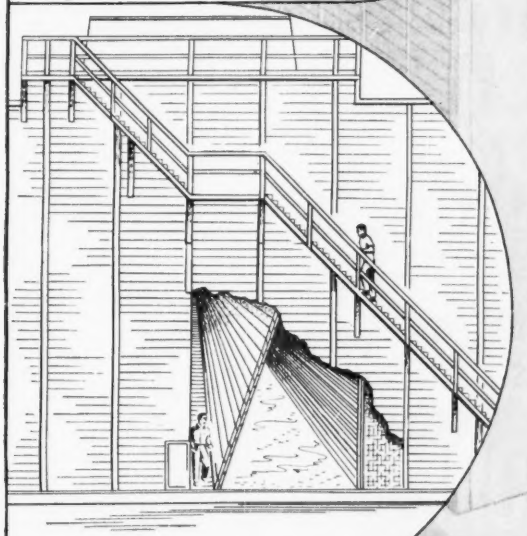
Egg Substitute From Milk

According to a recently patented invention, an improved egg substitute can be made from skim milk. The product, when whipped in the presence of water, forms a foam of improved characteristics, particularly with respect to stability to heat and volume of foam produced. Essence of the process is conversion of soluble calcium compounds in milk into practically insoluble or only slightly dissociated forms. In operation, skim milk is partly evaporated and treated with rennet suspended in water. When the mass gels, a solution of acid sodium

(New Technology Continued)

SAFETY A Fundamental Factor In Every *Double-Flow* COOLING TOWER





There is a new man in the cooling tower picture—the Safety Engineer. And Marley is justifiably proud that Safety Engineers for the nation's great industries heartily approve the Double-Flow. Their study has proved that only the Double-Flow is inherently safe.

Ascend the strongly hand-railed stairway of the Double-Flow to the fan deck. Inspect the sturdy, high-walled fan cylinders . . . high enough for safety, low enough for ease of inspection. There is plenty of room to walk easily along the fan deck, inside the complete hand-rail. Plenty of room to walk without contact with power lines . . . no danger from gusty winds.

Go down the short stairway to the open distribution basin. Again complete walkways facilitate inspection of this unique Double-Flow feature. Water flow is checked at a glance. Cleaning is a safe, simple operation only in Double-Flows.

Now step inside the tower through the inspection doors. On another walk you can travel the length of the tower, observe water break-up, condition of eliminators, vapor travel. Double-Flow full-height louvre walls give full daylight inside the cooling chambers.

Tower operators know that Double-Flows are safe towers . . . safe in any weather. They do not hesitate to give the Double-Flow full attention at all times.

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pyrophosphate and sodium hydroxide is added. The mixture is heated and stirred for several hours, cooled and the pH adjusted to 6.5 with dilute Na OH. The product is then spray-dried.

Digest from U. S. Patent 2,468,677, issued Apr. 26, 1949, on an application dated Aug. 3, 1944, to Torsten W. Lindewald, Norrkoping and Simon Gruben, Kimstad, Sweden, and assigned to Svenska Mjölkprodukter Aktiebolag, Stockholm.

CONFECTIONERY

Additives Prevent Oxidation Of Butter In Candy

Shelf life of butter-containing products is lengthened by addition of antioxidants. Decomposition of butterfat dispersed in sugar and water has been attributed to simple oxidation resulting from contact with entrapped or surface air. Oxidation forms peroxides which catalyze further reaction, with the result that the fat deteriorates rapidly after the required concentration of peroxide is formed.

Eight compounds were tested to determine their power to inhibit oxidation of butterfat. Minute quantities of the antioxidants were added to 50 g. samples of butter which were then heated to 140F. in a thermostatically controlled oven. At intervals, peroxide values were determined, and organoleptic tests made to confirm them. From the charted results it is apparent that propyl gallate was the most effective inhibitor: Butter to which it was added lasted about three times as long. Concentration of this additive was 0.0094 percent, well within approved limits given in Meat Inspection Division Memoranda Nos. 104 and 109.

Digest from "Antioxidants For Butter In Confectionery," Paper prepared by M. G. Mayberry, Mellon Institute of Ind. Research, Pittsburgh 13, for Amer. Assn. of Candy Technologists.

MICROBIOLOGY

Undesirable Changes In Wine and Cider

Cider and wines at times undergo changes due to the fermentation activities of heterofermentative lactobacilli. These are species of *Betabacterium* that are able to ferment malic and citric acids as well as sugars and glycerol.

In apple juice containing 0.4—0.5 percent acid, the malic acid may be fermented to lactic acid and CO_2 by these organisms, causing a decrease in

(New Technology Continued)

If you have doubts about Ac'cent in your food

(as one important food processor had)

He doubted that Ac'cent could improve the flavor of his beef stew. "Our beef stew is as good as we can make it commercially," he said. And his technical staff said the same.

You can try it on the consumer (as he did)

He agreed to test Ac'cent and try it on the public. He ran two batches of beef stew, one with Ac'cent added, one without. He sent to 562 families a can from each batch, and asked them to compare the two.

And find out what he found out (that people will like your food better when a little Ac'cent is added)

Out of the 1995 persons making up those 562 families, 1131 preferred the stew with Ac'cent! Here was the CONSUMER'S answer to this manufacturer's assertion that there was no practical way to improve his product.

Ac'cent is not a flavoring, not a condiment. It adds no flavor, aroma or color of its own. It simply, but wonderfully, brings out—and holds—the natural flavors of foods. With Ac'cent, you use your own formulas: you prepare as usual—just add Ac'cent.

Ac'cent is a 99+% pure monosodium glutamate, derived from vegetable sources. A wholesome product of Nature. 100 and 200 lb. drums.

Trade Mark "Ac'cent" Reg. U.S. Pat. Off.

At no obligation to you, we will welcome the opportunity to demonstrate what Ac'cent can do *in one of your own foods*—to pay the cost of a test run in your plant, including payment for the materials used!

Our food technologists will conduct the test. *You* be the judge. Wire or phone for full information.

Ac'cent® makes food flavors sing♪

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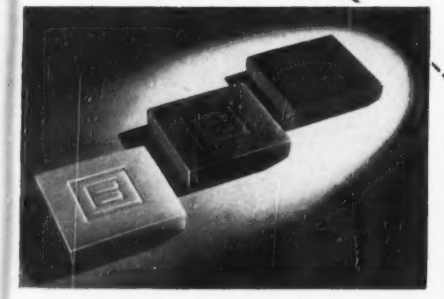
EXPERIENCE *Pays*



***BARECO MICROCRYSTALLINE WAXES** have, for many years, led the "Package Projection" field. This PROTECTIVE INGREDIENT is YOUR insurance against expensive loss through spoilage and contamination. You have faith in your product but that faith will not control weather conditions while that product is in transit or storage, therefore, you owe it to yourself and your product to test Bareco Microcrystalline Waxes. Remember . . . Wax has always been Bareco's business; why not take advantage of their years of experience and specialized knowledge.*

At the Bareco Laboratories: (a) Melting Point Test (b) Color Test (c) Viscosity Test . . . just three of many hundreds.
Wax Samples Available in Black, White and Amber.

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sourness, and reducing titratable acidity by as much as 50 percent. The action is slow and may take several months.

If low acid fruit juices are not fermented rapidly by yeast, betabacteria may ferment the sugars to lactic and acetic acids, and to CO_2. Some fructose will also be fermented to mannitol, and some succinic acid may be formed. The alcoholic fermentation comes to a halt prematurely, and the resulting wine has a sour-sweet, unpleasant flavor. This is the mannitic or mannite fermentation. The beverage will be found high in sugars, volatile acids, and fixed acids.

Following alcoholic fermentation, betabacteria sometimes attack the glycerol in dry wines or cider, producing lactic, acetic, and propionic acids. A harsh and burning flavor and repulsive odor are the result of such fermentation.

The betabacteria are quite sensitive to SO_2, but some strains are tolerant to alcohol. They have been a cause of spoilage in fortified wines containing 20 percent alcohol.

Digest from "The Role of Heterofermentative Lactobacilli in Cider Making", by D. W. Steuart, *Journal of the Society of Chemical Industry*, Vol. 68, 250-52, Aug. 1949.

MISCELLANEOUS

Protein Complexes From Malt Produce Chill-Haze

Exposure to either cold or hot air, produces a haziness in beer, due probably to precipitation of protein complexes originating in the malt. Chill-haze substance, isolated from beer and held for long periods at 0 deg. C., was found to be a protein-tannin complex containing 60-65 percent protein and 35-40 percent tannin, with a molecular weight of about 40,000. Sulphur was present to the extent of about 2 percent, and Cu, Fe and P were found in the ash. The chill-haze protein is probably a clevage product of barley globulin and beta-globulin. The latter protein, found only in barley, contains about 2 percent S, and has unusual resistance to the proteolytic (protein-splitting) action of enzymes in malt.

Oxidation-haze-substance may or may not be the same material as chill-haze but the two exhibit similar behavior. Chill-haze substances increase oxidation haze; high oxygen content of beer promotes chill-haze formation. Chill-haze can be measured with a nephelometer after chilling the beer at 0 deg. C. for several days. The Indica-

(New Technology Continued)

REX Roto-Brush Can Cleaner and Drier

Here's the modern answer to an old canning problem. The Rex Roto-Brush Can Cleaner and Drier—a fast, efficient and economical method for washing and drying all sizes of cylindrical cans.

5 Big Advantages—To You

1 *Improves Product Appearance*
The Rex Roto-Brush Can Cleaner and Drier assures you a clean and shiny package for your product—gives you positive product appeal. No more unsightly, stained cans on store shelves that the housewife passes by.

2 *Simplifies Labeling Problems*
Labels adhere better to dry, clean cans. Eliminate "rejects" caused by damaged or missing labels. No more production jams due to failure of labels to stick.

3 *Saves Space*
Eliminates long, air-drying conveyor lines. Use this valuable space for other operations. The Rex Roto-Brush Can Cleaner and Drier fits into a 3′ x 7½′ space.

4 *Saves Time*
The whole cleaning and drying process takes only a few seconds. Cans proceed to next operation at speeds up to 300 per minute.

5 *Durable, Dependable, Economical*
Machines are built to famous Chain Belt quality standards to withstand years of steady operation. Brushes in test machines are still in good condition after over a year of service. Machines are entirely automatic—no operator required. Only operating cost is for electric power.

The Rex Roto-Brush Can Cleaner and Drier may be exactly what you've been looking for to modernize your canning line . . . help increase your sales. Our new booklet gives you all the details. Just ask your nearest Chain Belt Representative about it or write the Chain Belt Company, 1616 W. Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

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YOU SHOULD BE THINKING OF

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In addition to manufacturing a superior food product you also gain production economies resulting from lower handling and storage costs.

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tor Time Test (I.T.T.) is a measure of the beer's sensitivity to oxidation.

Filtration at low temperatures removes chill-haze substance effectively, but subsequent pasteurization makes the beer more sensitive to both chilling and oxidation. Centrifugal separation is less effective than filtration, because of the mechanical heating during centrifuging. Double centrifugal separation, once at not to exceed 2 deg. C., followed by storage for a week at slightly below 0, and a second separation at as low a temperature as possible, yields a beer that compares favorably with filtered beer. It is advantageous to cool the separator bowl during operation to keep the beer from warming up and dissolving some of the chill-haze material. Liquid CO_2, and chilled air have been used for this purpose.

Changes in design which reduce air friction on the rotating bowl also help. Centrifuged beers have higher I.T.T. values than filtered beers and hence are less sensitive to oxygen, some oxygen, probably having been taken up during the centrifugation. Pasteurization reduces the I.T.T. values somewhat.

Digest from "Protein Hazes and Beer Separation" by Evald Sandegren, *Brauwissenschaft*, 138–40, Sept. 1949.

Cellulose Wiener Casing Colors Contents Uniformly

In the usual method of making skinless wieners, sausage emulsion is extruded into regenerated cellulose casings that are drawn through a linking machine. Lengths of sausage are draped over racks, on which they are carried through the subsequent operations of smoke-curing and cooking.

In the latter operation, a suitable dye, dissolved in the cooking water, penetrates the casing and colors the surface of the meat. In this method, the individual sausages frequently touch each other and the dye cannot reach the contact areas.

A patented regenerated-cellulose casing, designed to overcome this objection, is made by treating the casing with a suitable coloring matter that is transferable to the surface of the contents. In the process of manufacture, the wet casings are conducted through an aqueous solution of glycerine containing a soluble coal-tar dye, thereby plasticizing and coloring the casings in one operation. The color is said to be transferred uniformly to the sausage on contact.

Digest from U. S. Patent 2,477,767, issued Aug. 2, 1949, on an application dated Aug. 5, 1948, to R. K. Remer, Elgin, Ill., assigned to Transparent Package Co., Chicago.

—*End*

ON JOB AFTER JOB MORE AND MORE FOOD PROCESSORS ARE USING *Carpenter* STAINLESS TUBING TO KEEP EQUIPMENT ON THE JOB AND REDUCE MAINTENANCE COSTS

- Safeguards Purity + Flavor
- Is Easy to Clean
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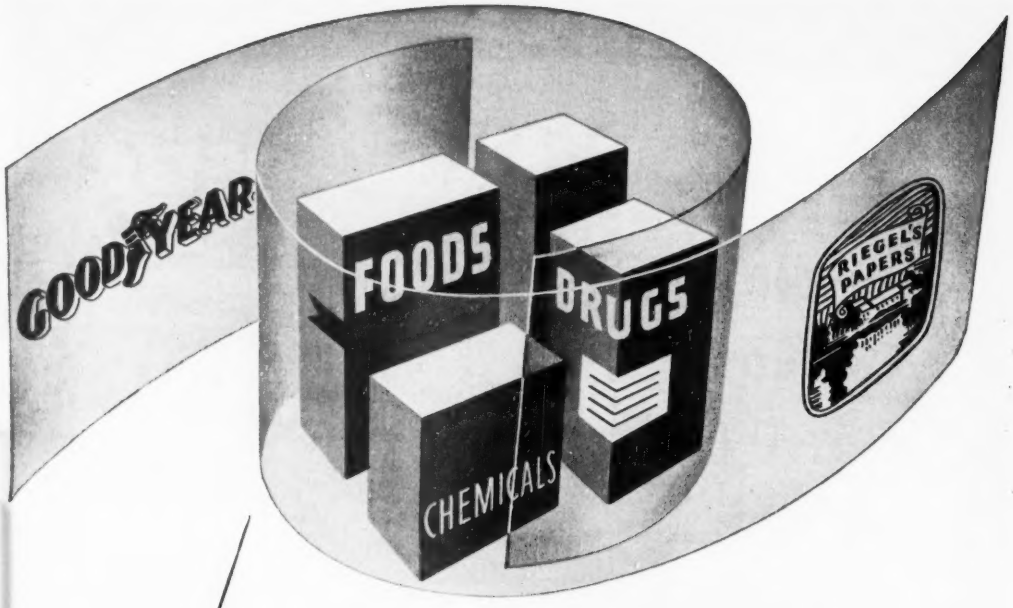

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PLIOLITE DIAFANE

Is not our only Pliolite coated material. Developments on other base papers are well under way — in fact, already in use on opaque glassine and on vegetable parchment. If your packaging problem calls for something entirely new — whether a liner, wrap or bag — Investigate!

When two big companies, each leaders in their respective fields, collaborate to produce a better paper for packaging—it's certainly worth your careful investigation.

Riegel's Pliolite Diafane was released for restricted commercial use more than a year ago, after lengthy experimentation by our own technicians in collaboration with Goodyear's Pliolite specialists. As a result of its thoroughly proven commercial value, this paper is now presented for general use where very high moisture protection is necessary, and cost a deciding factor.

Tests on *machine-made* packages wrapped in seven leading moisture-proof materials, have shown Pliolite Diafane second only to Goodyear's Pliofilm in its moisture-resistant qualities. In addition, it is transparent and glossy, inexpensive to print, sealable with heat or glue, and it works efficiently on all packaging machines.

The use of Pliolite Diaphane is definitely recommended for the packaging of popcorn, roll film, potato chips, dehydrated foods, prepared flours, soup mixes, hygroscopic chemicals, and a wide range of other products calling for a really moisture-proof package without attendant high cost. Write for samples and detailed data.

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MARKETING got some attention when these leaders got together at the GMA meeting. Seated, from left, are: J. L. Rankin, Pillsbury Mills; W. O. Dillingham, The Best Foods, Inc.; W. R. Parker, General Foods Corp.; and G. L. Clements, Jewel Food Stores. Standing: Robert Perlitz, Schumacher & Co.; C. C. Precure, National Association of Retail Grocers; and Geoffrey Baker, The Nestle Co.

GMA Urges Better Public Relations

Food executives told that their big job now is to make their story understood by the consumer

Promotion of public understanding of the grocery manufacturers' contribution to the nation's well-being, also panel discussions on the continuing battle to lower costs of production and distribution, were the major considerations at the 41st annual meeting of the Grocery Manufacturers of America, in New York, in November.

GMA President Paul Willis cautioned the more than 1,000 food manufacturing executives present that it was a mistake to assume that public support can be won by simply producing the best possible product and selling it at a reasonable price. There is too little association in the public mind, he said, between products people buy and the corporations that produce them. Accordingly, he continued, "people purchase our products, and delight in doing so, and then sometimes turn around and unwittingly go along with those who attack the very companies that make them."

Mr. Willis cited the great progress made by business, during the first half century, in developing mass production and mass marketing. Even though the public has directly benefited from this accomplishment, rabble rousers, demagogues and politicians have been able to sell many of the American people the idea that bigness in business is bad, that profits are bad, and that business management is greedy. Management from here on, Mr. Willis declared, must do an equally effective job of developing a full understanding, among the American people, of the functions of business and the benefits the people derive from them. He looked upon it as the real "must" job of the next half century.

Quality and Variety

Following a similar theme, H. J. Heinz II, president, H. J. Heinz Co., spotlighted the developments in food processing by comparing the present with the "cracker barrel" era of 1900. He demonstrated how in good years and bad the industry has kept pace with the demands of an expanding population and had maintained a continuous improvement in the variety and quality of its products.

While all these things were going on, Mr. Heinz said, one essential characteristic of the food industry did not change. "We have remained an industry of small companies, fiercely competitive. There are no Detroits or Akrons in the food industry. Hundreds of food processors operate in hundreds of small towns and villages throughout the country. One can still start in the food business with a small capital."

The economic role of the food industry in the future, as in the past, Mr. Heinz said, is complicated by the divergent groups the companies must please. "Our stockholders are entitled to an adequate reward for the investment of their money; employees are entitled to wages that will allow them to live comfortably; farmers expect a fair price for their products; and the distributor and retailer expect to earn an adequate profit for handling the products. And all of these demands must remain subordinate to the American housewife."

Still Can Improve

How well we are going to satisfy all elements largely depends on the processor's ability to perform services at an economical cost. Mr. Heinz cited a recent study that demonstrated his company could save $500,000 a year in the handling of goods. "When we compare our operations with the standards of the past," he said, "we all take pride in our efficiency. Yet, by the standards of the future, we will probably be appalled at our ineptness." He ventured the guess that every food company represented could eliminate the expenditure of a sizable sum without hurting its operations. He concluded: "To the degree to which each one of us demonstrates his ability to cut costs—to that degree can we meet our obligations to the various elements in the American economy."

Government's own statistics were used to place the cause of high food prices at the farm level by the Rev. E. A. Keller, C. S. C., director, bureau of economic research, University of Notre Dame. In 1939, he said, the farmer's share of the consumer's food dollar was 39c.; in 1947, 53c. Broken down by commodities, he showed that in 1947 farm value of meat products had increased 182 percent over the 1935-39 period. Marketing agencies, which include processors, increased only 29 percent. In dairy products, the increase was 120 percent, compared with 42 percent; poultry and eggs, 102 percent, compared with 85 percent; bakery and other cereal products, 169 percent, compared with 36 percent; fruits and vegetables, 151 percent, against 58 percent; and for miscellaneous products, 179 percent, against 73 percent.

These facts, Father Keller said,

should be told to the consuming public to dispel the misinformation concerning the share the farmer gets and concerning the cause of high food prices. He thought the facts also require a revision in the thinking regarding the farm problem and the plans proposed for its solution. He termed the Brannan Plan a sleight-of-hand political plan to win votes by promising the farmer continuing high income while promising the consumer lower food prices. The Plan contradicts the law of contradiction, he said, by offering the country high food prices without the country having high food prices. Father Keller noted the seven more obvious objections to the Brannan Plan listed by Allen B. Kline, president, Farm Bureau Federation:

1. The parity price approach to a fair exchange value for farm commodities is discarded.

2. It repeals, in effect, the philosophy of fair farm prices in the market place, which is contained in the Agricultural Adjustment Act of 1938 and the Agricultural Act of 1948.

3. It means government administered farm prices and farm incomes, with government control of all land and livestock production.

4. It introduces a cheap food philosophy. It seeks to establish a principle that taxpayers should pay a considerable portion of the consumers' grocery bill.

5. The proposal would place a ceiling on opportunity in agriculture. This in turn would result in penalizing efficiency. Food prices would eventually reflect this inefficiency. We view any unit limitation as a dangerous precedent—an opening wedge which would eventually result in government supervised and stabilized agricultural poverty.

6. The cost of implementing this proposal would be staggering.

7. The income of American farmers should not be made dependent upon annual appropriations from the Federal Treasury.

Wants Farm Floor

Complete removal of farm price supports, however, was not a solution, in Father Keller's opinion. He said: If a floor is put under wages, in a minimum wage law, then certainly the farmer should have a floor to protect him against the kind of price collapses that nearly ruined agriculture in the 20's and 30's.

Out-of-stock statistics are back to prewar level, in the surveys made by the A. C. Nielsen Co., according to company president, A. C. Nielsen. After rising from a prewar level of 7 percent to a peak of 29 percent on Aug. 1, 1946, they were down to 7 percent on Aug. 1, 1949. Even though this figure is relatively low, many manufacturers look upon it as a disturbing loss of advertising appropriations.

While no brand has been reduced to an out-of-stock percentage of zero, Mr. Nielsen said, many producers are consistently holding the figure to 3 percent instead of the 7 percent that is average. Incidentally, he added, many are substantially above the 7 percent mark.

Pick Your Spots

On this point, Mr. Nielsen emphasized that a brand does not have to be in every store to have good distribution. Based on the 1940 census of distribution, he noted that 20 percent of the grocery stores do 67 percent of the business; 40 percent do 86 percent of the business, and 60 percent do 95 percent of the business. This relationship, of course, differs widely with various commodities. It is important, therefore, to have the facts of the particular commodity, and then to so manage distribution as to get into the stores that will really count.

Bruce Barton, of Batten, Barton, Durstine & Osborn, Inc., asked the GMA members to face the fact that we are now living in a pressure-group state, and that when we talk about the private enterprise system we are talking history, not reality. If business is to play any successful part in persuading the pressure groups to ask less and give more, it must first sit down and decide how it can give more, and whether, at some points, it can and ought to ask less. "The people we want as allies," he said, "are the people who are going to decide who of us shall be allowed to do business, how much business we shall be allowed to do, and how much money we shall be allowed to make.

"Let us," he concluded, "stop talking about that part of the social revolution which is gone beyond recall. Let us face the facts and plan for the future."

ABCB Officers (from left): John J. Riley, secretary; Truman W. Gill, president; and A. G. Beaman, vice-president.

Bottlers Tackle Costs

ABCB members advised to dig into their individual problems in order to eliminate inefficiency

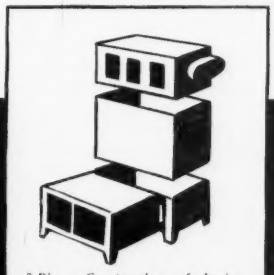
Faced with steadily increasing ingredient and labor costs, and consequent reduction in profits, more than 2,600 bottlers assembled in Detroit in mid-November to learn how to produce better beverages at lower costs, how to sell more of them, and how to distribute them with greater economy.

The event was the 31st annual meeting of the American Bottlers of Carbonated Beverages, held in the huge Detroit convention hall. The ABCB National Beverage Exposition, featuring new and improved equipment, was held in conjunction with the meeting.

Especially emphasized was the making of the beverage industry into a continuing and a profitable one. In the words of ABCB's president, Truman M. Gill, "a special effort has been made to feature our industry's cost problems—which are so vital to all of us."

Throughout the sessions of the four-

THE AIR CONDITIONING UNITS THAT ARE *Simple to Install!*



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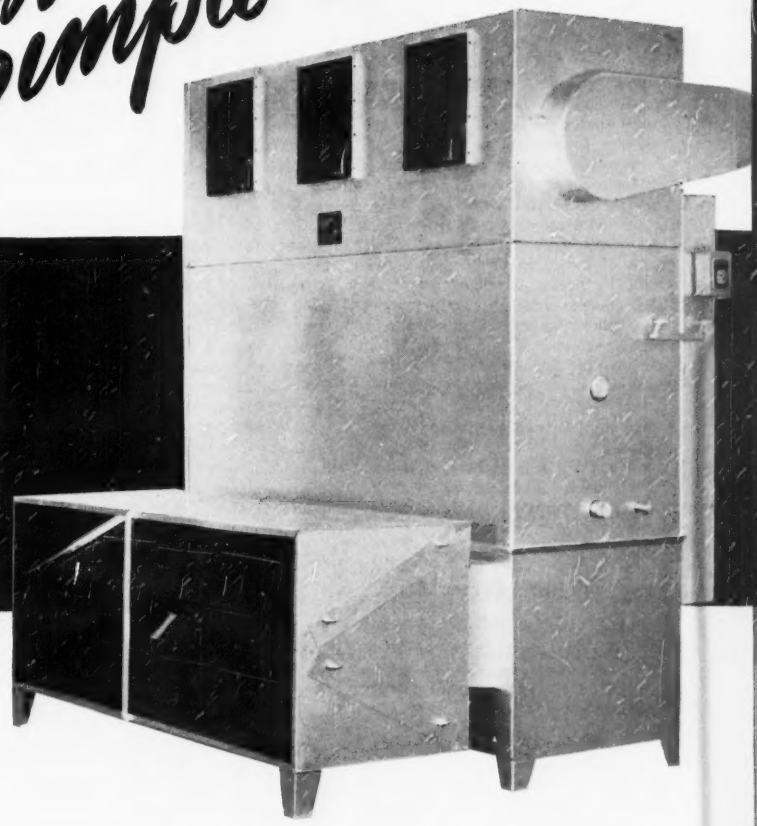

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NOT only can "Buffalo" VPC Comfort Conditioning Cabinets smooth out many a management and production problem, but they can do it at reasonable installation and operation cost in your plant. The simplified Model "F" construction requires minimum attention over long periods of continuous operation. VPC Cabinets provide the exact air conditions you require—for better working conditions, for better process conditions, better quality and cheaper production. Why not put your plant air to work in this way? The cost is less than you would expect. Just ask your nearest "Buffalo" engineering representative.

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Branch Offices in All Principal Cities

day meeting, this cost factor was kept in the foreground—whether the subject under consideration was sales promotion, materials handling, vending machine operation, or labor relations.

The subject of increasing costs of materials, especially sugar, was highlighted in the report of the association's special sugar committee. Blame for the present shortage, and consequent high price, of sugar was placed on Secretary of Agriculture Brannan, who was charged with creating and maintaining an artificial shortage to force prices up for the benefit of 56,000 beet and cane growers in the U. S.

Increased labor cost and reduced production per man-hour was emphasized in "The Industry's Outlook," a discussion carried on by a panel of six representative bottlers from different parts of the country. Moderator was John F. Leary, Newburyport, Mass. Said one panel member: "In my bottling plant, wages are slightly more than double the 1941 rate. Its output per man on delivery trucks has fallen more than 50 percent in the same period."

Panel members were: E. A. Bostrom, Grand Forks, N. D.; John W. Davis, Roanoke, Va.; J. B. Maher, Des Moines, Iowa; George A. Silver, Los Angeles, Calif.; J. B. Smith, Atlanta, Ga.; Louis L. Varga, Bridgeport, Conn.; and P. F. Whitcraft, St. Louis, Mo.

But optimism was expressed by most panel members. Exemplary was this expression by one member: "The individual bottler is digging into his own problems." This, it was felt, would result in many bottlers finding, for the first time, their real costs, and segregating inefficiency from actual costs.

New Equipment

Although the mammoth displays of bottling equipment, which featured the 1947 and 1948 expositions, were absent, many newer and smaller devices for speeding production and reducing labor costs were exhibited at the beverage exposition.

Attracting top interest at the show were several machines for automatically unloading cases and cartons. Further advances in palletized handling of filled and empty cases were demonstrated. And numerous trucks and bodies, designed primarily for this industry, were on display.

The following officers were re-elected for the coming year: President, Truman M. Gill, Beeville, Tex.; vice-president, A. G. Beaman, Nashville, Tenn.; treasurer, Joseph La Pides, Baltimore, Md.; secretary, John J. Riley, Washington, D. C.

Institute Airs Butter Problems

Greater attention to advertising and other selling technics is expected to increase consumption

"Selling Days Are Here Again." This slogan characterized the program of the 41st Annual Meeting of the American Butter Institute at Chicago in November. Interest in the program was indicated by the more than 350 registrants, the unusually large attendance at the meetings, and the number of top executives present.

President E. J. Davidson urged that serious consideration be given to the three major problems: 1. Government price supports, which have resulted in unrealistic price differentials between 89- and 90-score butter, retarded sale to consumers of 90- and 92-score butter, and increased offerings of the higher grades of butter for government purchase; 2. continuation of public relations program on a sound educational level to keep the general public and Congress informed on the butter industry, on the quality improvement program, and on the nutritive value of butter; and 3. expanding of the per capita consumption of butter from the present approximately 12 lb. to the higher prewar level of 17.6 lb. annually.

He reported butter production and consumption for the first nine months of 1949 to be about 17 percent over that of the same period in 1948, noting that the 114,000,000 lb. for September was the greatest for that month since 1943.

Spend to Compete

Russell Fifer, executive secretary of the Institute, outlined the need for greater expenditure of funds for advertising, public relations and merchandising to combat the heavy expenditure of manufacturers of competing products. The estimated ratio was stated to be about $12.00 by oleo makers to about 1c. by butter makers. He proposed that correction be made by surveying and applying new, constructive, merchandising, advertising and public relations technics to aid in accelerating the marketing and sale of butter and to keep American consumers informed on the vital importance of the American dairy industry to the national welfare.

Bert C. Goss, vice-president, Hill & Knowlton, Inc., made a progress report on the Institute's public relations campaign to: 1. Establish and maintain public regard for butter as the foremost quality spread; 2. keep dairy farmers, all branches of the dairy industry, and the communities they support, aware of the importance of butter to dairying, and 3. keep consumers informed on the likelihood of fraudulent sale and service of butter substitutes and on the relative values of table spreads. He stated that the comprehensive public relations program under way is to achieve these objectives over the next several years.

Campaign Details

The program includes a new series of plans, speeches, and releases for use in member communities, new background information for newspapers, magazines, and radio; a series of signed articles and cartoons distributed by the Western Newspaper Union throughout rural areas; and an Armour Foundation study disproving the claim that the use of domestic vegetable oils imparts a natural yellow color to oleomargarine.

These services are in addition to surveys made among consumers and among restaurants to obtain factual data to supply to Congress relative to reaction to oleo taxes and fraudulent serving of yellow oleo as butter.

Goss stated that the campaign has not been organized to seek special privileges or favors for butter but rather to protect it against misrepresentations and the consuming public against fraud and deception by substitutes. He commended the Institute members for urging Congressional repeal of federal taxes and license fees in return for a ban on the movement of yellow oleo in interstate commerce.

D. A. Nickerson, Armour and Company, conducted a more than two-hour Cream Quality Dairy Training Conference, during which demonstrations were made to show how dairy farmers are schooled in methods for improved sanitation, higher quality milk and cream, and better use of the mechanical separator to obtain maximum percentage of cream as well as to assure increased sanitation.

Other speakers on the program dealt with management problems, the 1950 support policy for the dairy industry, and training of salesmen.

Newly elected officers are: G. L. Ogle, Ideal Pure Milk Co., Evansville, Ind., president; O. E. Droege, Swift & Co., Chicago, vice-president; N. R. Clark, Swift & Co., Chicago, treasurer; and Russell E. Fifer, Chicago, executive secretary.

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BY K&M "FEATHERWEIGHT"® 85% MAGNESIA PIPE INSULATION

The fuel dollars, the power dollars, the production dollars, are what cannot escape at will, where K&M "Featherweight" Insulation imprisons the heat. K&M "Featherweight" cuts, fits and handles without waste effort and material. Maintenance expense is warded off, too, by the high physical strength of "Featherweight" and by its resistance to adverse atmospheric factors.

Modern high-strength lightness in a material with the inherent multi-cellular structure to keep heat in its place, is achieved by the K&M way of correctly compounding clean Asbestos Fibre with basic Carbonate of Magnesia.

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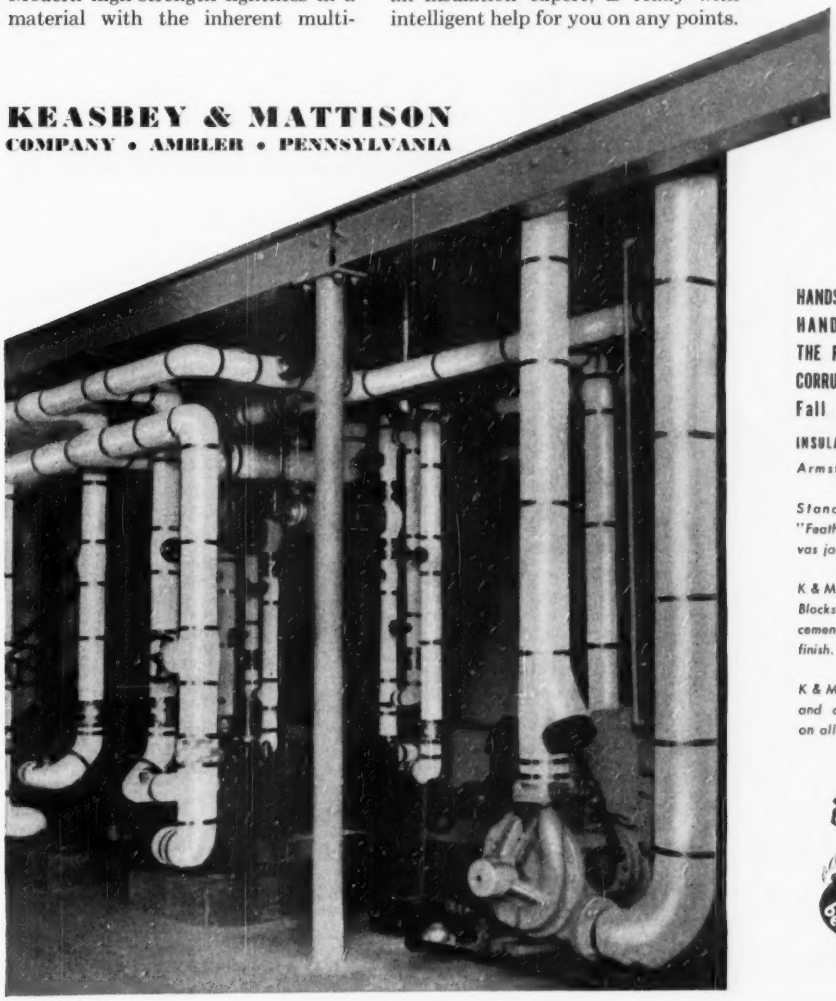

HANDSOME DOES AS HANDSOME IS IN THE PLANT OF J & J CORRUGATED BOX CO., Fall River, Mass.

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Standard thick K & M "Featherweight" with canvas jackets, on all piping.

K & M 85% Magnesia Blocks on all flanges, with cement and canvas jacket finish.

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Backing up our idea of what a complete bag service should be is a widely-flung sales organization, one or more members of which are near you. Betner Bags are, in effect, as close to you as your classified directory.

Your product will GO safely in one of these types of bag

Foil
Wax-glassine
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Betner bags are "proofed" against . . .

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Many Betner bags are THERMOSEAL*-ed

This is our patented, heat-sealed closure which gives up to 20% greater protection.

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CAMP BETNER CORP., Richmond, Va.; BENJ. C. BETNER CO. of WISCONSIN, Appleton, Wisconsin; BENJ. C. BETNER CO., Paris, Texas; BENJ. C. BETNER CO. of CALIFORNIA, Los Angeles, California.; SOUTHERN PACKAGING CORPORATION, High Point, N. C.; Affiliate of Benj. C. Betner Co.

A complete bag service—from idea to finished bag to machinery for closing coffee bags and filling and closing liner bags for cartons.

Food Industry News

Food Law Group

Among those gathered for the dinner that launched new Food Law Institute, in mid-November, were (from left): Arthur T. Vanderbilt, chief justice, New Jersey Supreme Court; Harry Woodburn Chase, chancellor, New York University; Charles Wesley Dunn, Institute president; William M. Robbins, Institute chairman, and vice-president, General Foods Corp.; Russell D. Niles, dean, New York University school of law; and Paul B. Dunbar, commissioner of foods and drugs.

Food Law Organization Launched By Processing Companies

Food Law Institute, Inc., a newly-formed educational organization, was launched at a dinner at the Waldorf-Astoria, November 17, with William M. Robbins, chairman of the Institute and vice-president of General Foods Corp., presiding.

The Institute will be supported by contributions from major food companies, most of which were represented at the initial dinner. A minimum annual income of $50,000 has been set to carry out the objectives of the new body, which are to develop post-graduate instruction and research in food law at university schools of law.

Establishment of two courses in food law at the New York University Graduate School of Law was revealed as the Institute's first major activity. Thirty-eight students, including six with fellowships provided by the Institute, are enrolled in the courses. The law schools of the Universities of California, Washington and Minnesota have also indicated interest in the courses, and the Harvard Graduate School of Business Administration has also agreed to cooperate in the Institute's program beginning with a series of introductory lectures in 1950.

Charles Wesley Dunn, prominent counsel for the food industry, is president of the organization.

Still Another Company Is Freezing Citrus

A new, company, Grant Packing Corp., with J. William Horsey, Toronto, Ont., and St. Petersburg, as chairman of the board, has been formed to operate a $750,000 frozen citrus concentrate plant at Plant City, Fla.

The new plant will have a rated capacity of 1,130,000 gal. of frozen concentrated juice in 140, 24-hour-days. Capacity can be doubled with minimum expense. The plant is scheduled to be completed in February and will employ about 40 persons.

A four month run in the current season, with a nine-months' normal season, is planned. Bulk of the fruit will come from the Polk County groves of Alcoma Corp. and its affiliates, whose president, A. R. Updike is a director of the new company.

Closely associated with Grant Packing Corp. are Sperti Citrus, Inc. and Sperti Foods, Inc.

Packaging Exposition

Chicago's Navy Pier will house the 19th annual national packaging exposition of the American Management Association, from April 24 to 27. J. M. Cowan, chairman of the exhibitors' advisory committee, recently declared that attendance at this year's show was expected to exceed 14,000.

An analysis of last year's exposition in Atlantic City was also made known by Mr. Cowan. Representatives of over 5,000 firms, in 400 industries, he said, explored the products and services offered by 200 exhibitors. More than 40 percent of those who attended were either owners, officers, or held top-management positions in the companies they represented.

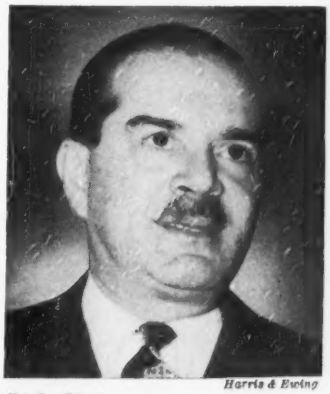
Manufacturing Survey Readied by Census

Bureau of Census is making a survey of a representative group of manufacturing establishments to determine production of commodities and manufacturing activity in 1949. The survey will contact about 45,000 manufacturing establishments early in 1950.

The standard report form will seek general information on pay rolls, employment, cost of materials, new plant and equipment, value of shipments, and limited data on certain important materials consumed. By suitable sampling of industries, it is hoped that reliable estimates may be made of national totals, assuming the same relationship of the sample to the whole as existed in 1947.

Because of the limited number of companies to be contacted, it is hoped that some kind of production summary for this calendar year can be prepared by the Bureau during the middle of 1950.

(Industry News Continued)



Harris & Ewing

FAO Chairman

Oscar Gans was elected permanent chairman at the U. N. Food & Agriculture Organization's fifth annual meeting, in Washington, in November. Dr. Gans is the Cuban Ambassador to the United States. Food experts from 58 nations attended the meeting.

New Book on Nutrition Published by Heinz

Nutritional Data, a new book prepared for distribution to physicians and professional nutritionists, is now being released by H. J. Heinz Co.

Authors of the book are Dr. H. A. Wooster, Jr., and Dr. F. C. Blanck, of the Heinz Nutritional Research Division, at Mellon Institute, Pittsburgh. The publication is the successor to the twelfth edition of the company's Nutritional Charts Book, which has been accepted as an authority by professional dietitians and doctors since 1934.

Completely modernized by the addition of new research findings, *Nutritional Data* includes sections on vitamins, the essential elements, proteins and amino acids, the availability of nutrients, signs and symptoms of malnutrition, the metabolism and action of foods, human nutritive requirements, planning diets for good nutrition and tables of food composition and nutritive value.

The book is available only upon written request by physicians, nutritionists, dietitians and others qualified by professional duties in the food field.

Beer Consumption Is Up Companies Are Down

Beer sales are following an irregular pattern in a trend toward greater concentration of business among fewer companies, according to a survey of the brewing industry, compiled by the Research Co. of America.

In 1943, for example, the nation's 25 leading brewers sold 41.4 percent of the beer; while in 1948 their share was 49.25 percent. During one year of that period, the entire industry broke all records by selling 87,076,141 barrels in 1947.

Among the 25 leaders, only two—Pabst and Griesedieck-Western—made unbroken gains in sales during the period between 1944 and 1948. At the same time, only two brewers suffered net losses in sales position, selling less in 1948 than they did in 1944.

Most of the jockeying for sales position occurred in the top half of the leaders. In the first 10, only three maintained a status quo for more than two consecutive years.

Even the nation's top-selling brewing companies have found the lead position insecure during the past five years. Schlitz and Anheuser-Busch have each held the No. 1 spot for two consecutive years since 1944, while Pabst claimed the lead in 1946.

Bakers Form Committee To Study Equipment

A Baking Industry's Sanitation Standards Committee was organized at a meeting at the Bakers' Club, New York City, November 22, to develop standards of design, location and function of bakery equipment, machinery and ovens.

By a cooperative effort within the industry, the committee hopes to make strides toward developing sanitation standards that will meet the needs of the industry and the public.

Organizations participating are: American Bakers Assn., American Institute of Baking, American Society of Bakery Engineers, Associated Retail Bakers of America, Bakery Equipment Manufacturers Assn., and the Biscuit & Cracker Manufacturers Assn. Each group has elected three representatives and sub-committees will be formed for different types of machinery and equipment.

Allan T. Prosser, Ward Baking Co., New York City, was elected chairman; A. J. Faulhaber, American Stores Co., Philadelphia, vice-chairman, and Raymond J. Walter, Bakery Equipment Manufacturers Assn., recording secretary.

Seek B.W.I. Labor

A group of 15 Wisconsin canning company officials made a trip to Jamaica, B.W.I., to confer with British city officials on getting seasonal workers for Wisconsin's canning industry. The group was headed by Marvin Verhalst, executive secretary of the Wisconsin Canners' Association. Before leaving Wisconsin, Verhalst stated that it was the intention to have about 1,500 Jamaicans come to Wisconsin in 1950 to work for canners in the fields and plants.

IFT Meets in May

The Institute of Food Technologists has scheduled its 10th annual meeting at the Edgewater Beach Hotel, Chicago, May 21 to 25. Last year's San Francisco meeting was held in July.

Lloyd A. Hall, Griffith Laboratories, is chairman of the national program committee, with Milton E. Parker, Illinois Institute of Technology, Chicago, heading the publicity committee.

Secondary Boycott

Di Giorgio Fruit Corp.'s two-year strike by an AFL union got a hearing before the National Labor Relations Board, in November. Big issue was whether agricultural workers, who have no protection under the Taft-Hartley Law, may be prosecuted for violating it. NLRB's counsel thinks they can and is pressing secondary boycott charges against the union.

Pink Union

The Food, Tobacco and Agricultural Workers' Union is due to be kicked out of the CIO and its jurisdiction taken over by an anti-communist group. Charges of following the Communist Party line, lodged by the CIO against both the union and its leader, Donald Henderson, are being heard by a CIO trial committee.

Campbell Chairman Dies

Dr. George Morris Dorrance, chairman of the board, Campbell Soup Co., and noted plastic surgeon, died suddenly at his home in Philadelphia, November 21.

DISTRIBUTION

Ice Cream Manufacturers Told of Selling Plan

One of the most comprehensive and instructive selling plans for ice cream manufacturers ever utilized by the industry was presented at the ninth annual meeting of the Quality Chekd Ice Cream Association, December 1 and 2. The two-day session at Chicago's Palmer House was attended by 176 representatives of the 52 independent ice cream manufacturers who are members of Quality Chekd.

The new sales plan provides each member with a complete, step-by-step procedure for securing new accounts and for more adequate servicing of old ones. Red morocco binders containing complete printed details were presented to the members by merchandising director, Norman Kloker.

In his address to the opening session of the meeting, president Irving Weber, Sidwell Ice Cream Co., Iowa City, Iowa, called for more and better sales training throughout the ice cream industry.

"If I were to name the two weakest links in the ice cream industry today," said Weber, "I would say without hesitation: First, poor merchandising of our product at the dealer level, including over-pricing, and, second, inadequate training of our sales representatives, both the route salesman and the foot salesman. No doubt the two weaknesses are related and interlocked. If salesmanship is improved, then and only then, can we do anything about poor merchandising."

(Industry News Continued)

Another Successful Application of the ROLACODER* Marking Machine

Write for Data Sheet 6.0 and FREE Marking Engineer's Analysis form

** Pat. Pending*

Maple Leaf Milling Co. saves a girl on every packaging line by using ROLACODERs to code-mark cartons automatically. ROLACODER not only replaces rubber-stamping and stencilling manual labor . . . it also assures neater, cleaner, more accurate marking. Friction-operated, precision-engineered. Uses interchangeable rubber type. Thousands of ROLACODERs at work marking all kinds of packages in conveying, sealing, filling, other packaging operations. *Pays for itself in months!*

MARK O MATIC

ADOLPH GOTTSCHO, INC.

MACHINES TO MARK WHATEVER YOU MAKE

191 Duane St., New York 13, N. Y.

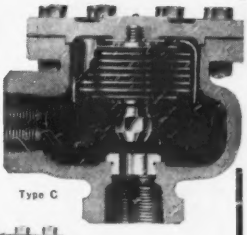
Representatives throughout U. S. and Canada

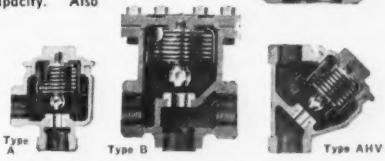
Leading Processor

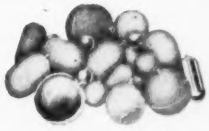
SHORTENS OPERATION from 65 to 45 Min.

with Nicholson Steam Traps

Records of a recent installation of Nicholson steam traps, by a large food packer, show they cut cooking time 30%; e.g., one operation was shortened from 65 to 45 min. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential; 2) have 2 to 6 times average drainage capacity. Also record low for steam waste; and maximum air-venting capacity. Widely specified for preventing damage to thin gauges; eliminate cold blow in unit heaters.



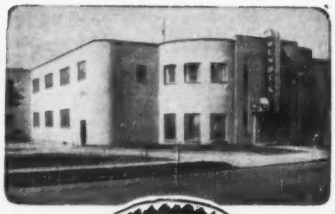




5 TYPES FOR EVERY PURPOSE—Size ¼" to 2"; press. to 225 lbs. **BULLETIN 1047.**

HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms and as tanks or vessels. 2-day delivery. **BULLETIN 348.**

W. H. NICHOLSON & CO., 193 Oregon St., Wilkes-Barre, Pa.



FRICK

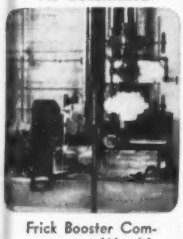
Refrigeration

HELPED BUILD THIS $600,000 DAIRY PLANT

Twenty-five years ago Edwin J. Wendt started in the milk business with one route and one small Frick refrigerating machine.

Today his new plant at Niagara Falls, N. Y., serves 18 routes, makes 1500 gal. of ice cream daily, has a wonderful dairy bar, and uses six Frick compressors—one a booster for low-temperature work. Installation by Mollenberg-Betz Machine Co., Frick Sales-Representatives in Buffalo.

The Dairy Bar is Air Conditioned



Frick Booster Compressor at Wendt's

Another proof that "the users of Frick Refrigeration make money." Put YOUR cooling problems up to the nearest Frick sales-engineer.

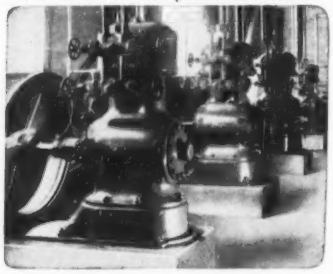
DEPENDABLE REFRIGERATION SINCE 1882

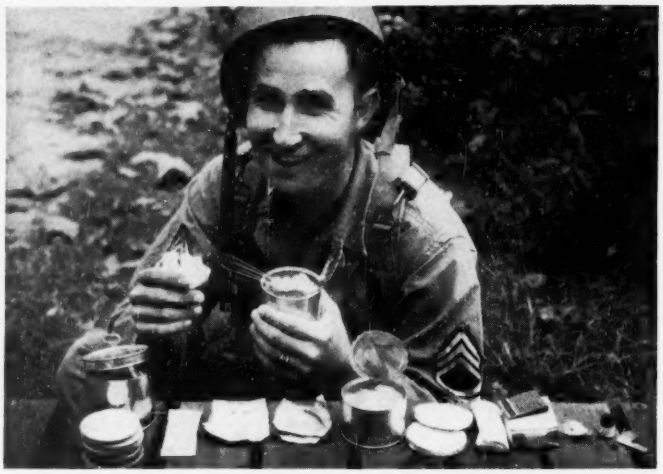
FRICK CO.

WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery

Four of Six Frick Compressors at Wendt's





Back to "C" Rations

—But the military has been working on improving them. Here is the "C-4" ration, which the Army says has proved to be the best all-round ration developed in a century. One full day's supply of three meals comes in a box, each item in an individual can. We see a sergeant having a typical lunch.

Weber, who has served as president of the association since its founding five years ago, traced its rapid growth. From 21 original members in four states in the fall of 1944, it has increased to the present 52 members in 14 states.

A wide variety of topics was covered at the two-day meet. Special panel discussions were held on ice cream costs and on production problems. Sessions were also devoted to ice cream merchandising for self-service stores, quality control, new items, and packaging equipment.

Frozen Foods Education Planned on Coast

The basis for a long-sought educational-type frozen food promotion was launched early in November in San Francisco. The proponents of this plan, headed by Alvin Langfield, Frozen Food Distributors Co., Oakland, Calif., are part of the same group of distributors who proposed, to the 1947 and also the 1948 Frozen Food Convention, an industry-wide, cooperative advertising program similar to that of the American Meat Institute. Packers, however, have not been inclined to engage in a joint program, preferring instead to use advertising funds to promote the sale of their own brands.

The program, as introduced by the Frozen Food Distributors Assn., of California, is built around the 40-page booklet, "A Short Course on Frozen Foods." The initial test was limited to the home economics teachers of San Francisco's public schools. When further tests are successfully completed, it is hoped to expand the plan to include instructors in universities, food commentators on newspapers and radio programs, cooking schools and even the field of locker plants.

Imitation Foods OK'd If So Labeled

Variations of a food for which a standard of identity has been established may be legally sold in at least one judicial district, if they are labelled "imitation." This ruling recently made by Judge Hatch of the U. S. District Court, at Albuquerque, N. M., is contrary to the interpretation of the Food, Drug & Cosmetic Act, which F&DA has been following since 1938.

The court's decision was based on a case brought against the Pure Food Mfg. Co., Denver, on a shipment of imitation fruit jams. Marketed in consumer packages, the labels carry the legend, "Delicious Brand, Imitation (name of fruit) Jam." A statement of ingredients is also included.

It was contended that its label conformed to Section 403 (e) of the Act, which sets forth in part: ". . . a food shall be deemed misbranded if it is an imitation of another food, unless its

label bears in type of uniform size and prominence, the word 'imitation' and immediately thereafter the name of the food imitated."

Judge Hatch held that the word "imitation" is of ordinary meaning and clearly understood by consumers.

Final Action Expected On Margarine Bill

The 63-yr.-old margarine vs. butter battle may be decided soon.

During the last session of the present Congress, a long step was taken toward elimination of restrictions on margarine. The House of Representatives voted repeal of the heavy special taxes paid by consumers of margarine and the stiff license fees exacted from its manufacturers and handlers. This bill, H.R. 2023, now needing only Senate approval, has been designated by Majority Leader Scott W. Lucas (D., Ill.) as "the first order of business" of the present session.

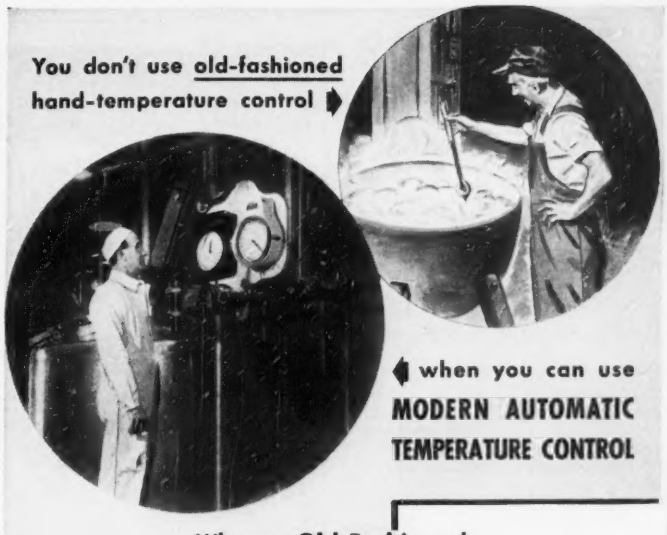
The bill eliminates the Federal 10c. per lb. tax on yellow margarine and the ¼c. per lb. Federal tax on white margarine. It repeals the $48 and $6 license fees that retailers must pay to handle yellow and white margarine respectively. It also repeals license fees of $480 and $200 now imposed on wholesalers who handle yellow or white margarine, and it eliminates a manufacturing fee of $600 now paid by all producers. The measure retains drastic identification and labeling regulations and requires that each serving of margarine in a restaurant be identified as such.

(Industry News Continued)

Wide World

Farmer's Daughter!

And the "ideal" one, too. At least that's what she was titled in a contest at the National Farm Show, Chicago. Her name is Virginia LeArta Jensen and her home is in Blair, Neb. Telephone number—. Must we tell you everything?



Why use Old-Fashioned
Spice-Flavoring Methods when you can use

MM&R SPICE OILS, the MODERN Method of FLAVOR CONTROL

In flavoring food products, the elements of chance and human error are reduced to a minimum through the use of modern, concentrated liquid spice Essential Oils.

Only Spice Essential Oils offer positive uniformity and purity . . . plus important economies in storage, shipping and handling.

A glance at the panel to the right will reveal many more important reasons why a growing number of progressive manufacturers are switching to Spice Essential Oils . . . the MM&R brand . . . pace-setter in the field of Spice Oils for the food industry.

11 Reasons why you should use MM&R SPICE ESSENTIAL OILS

1. Uniformity of quality and flavoring
2. No color disturbance
3. Less bulk in storage
4. Less weight in shipping
5. No danger of molding
6. No loss by exposure in package while being stored
7. Free from bacteria
8. Ease of handling
9. Less cost as compared to equivalent spice value
10. Entire flavor available immediately
11. Elimination of the possibility of dust and dirt

Send for complete information and "Table of Equivalents" showing comparative flavoring strengths of whole spices and spice oils.

MAGNUS, MABEE & REYNARD, INC.
SINCE 1895 . . . ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS
16 DESBROSSES STREET, NEW YORK 13, N. Y. • 221 NORTH LASALLE STREET, CHICAGO 1, ILL.
LOS ANGELES: BRAUN CORP. • SEATTLE, PORTLAND, SPOKANE: VAN WATERS AND ROGERS, INC.
SAN FRANCISCO: BRAUN-KNECHT-HEIMANN CO.

Tough yet Gentle

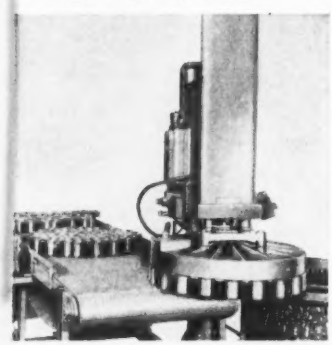
Cambridge WIRE BELTS

Combine Movement with Processing Through Fire or Water

Cambridge Wire Belts shrug off extremes of temperatures, corrosive agents, torsion, strain and wear. They hustle rough, bulky objects through the most rigorous treating processes, or convey delicate products with maximum safety.

Tempering, quenching, washing, baking, sizing, sorting, packaging, glazing; throughout industry, Cambridge Wire Belts are working at nearly every bulk material processing job. Each of these Cambridge Belts is fabricated in the proper mesh, weave, metal or alloy to do the job better, faster, safer and more economically.

Let a Cambridge Field Engineer help you secure these advantages for your operation.



A Cambridge "Gratex" Wire Belt conveying baby food jars to a W. F. & John Barnes Junior Hydro-Magnetic Crate Loader and Unloader. The small-bottomed jars won't tip or trip when shuffled on this closely-woven belt.

Write for FREE copy of the 130-page, illustrated Cambridge Wire Belt Catalog. It's an education in belt and conveyor design, application, installation and operation.

Cambridge Wire Cloth Co.

Dept. Q • Cambridge 1, Md.

Wire cloth in rolls | Also specialized wire fabrications

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Look Under "Belting, Mechanical" In Your Classified Telephone Directory

Wide World

Corn Hangar

Storing corn became more urgent than garaging airplanes, so this hangar at the Ottumwa, Ia., airport was taken over by 245,000 bu. of corn. Plan should work whenever storing "season" can be made to coincide with the "slow" flying season.

Greater Value Offered In Candy Products

The candy consumer's dollar is growing in value according to an analysis made by the council on candy of the National Confectioners' Association.

Combining results of a council-conducted survey among leading manufacturers with Department of Commerce statistics, the study indicates that, compared with a year ago, the candy purchaser is getting more for his money in quantity, quality, or both, whenever he buys a nickel candy bar, a bag of bulk candies or the fancier packaged goods.

Comparisons were made with August, 1948. In this one-year period, more than two-thirds of the candy bar manufacturers questioned by the council had increased the size of their product an average of 20 percent. The average candy bar today is approximately 12 percent heavier than it was a year ago. Today, most bars manufactured by those questioned range from 1½ to 2 oz. A year ago, they averaged around one and one-fourth ounces.

Candy producers' average wholesale price for bars was about 40 cents a pound in August, 1948, compared with 35 cents in August this year.

Stocks of Kraut Fade

Kraut stocks on December 1, were 30 percent less than on the same date a year ago, according to an inventory report made by Art Henkel, president, National Kraut Packers Assn., at a special meeting in Cleveland late in November. Packers, themselves, reported stock disappearing from grocery shelves at an unusually high rate.

The meeting was held to shape plans for the final drive in the coming promotion of kraut and frankfurters, pegged on National Kraut and Frankfurter Week, February 2 to 11.

Yeast Scum Prevented In Pickle Storage

A way to prevent formation of yeast scum on pickle storage vats has been perfected by Dr. J. Orvin Mundt and Frank Phillips, a graduate student, of the University of Tennessee, Knoxville. Dr. Mundt said that the bacteria-laden scum appears on salt brine vats, making cucumbers soft and slimy and lowering quality.

The two bacteriologists have proved that a 0.1 percent concentration of sorbic acid in the usual brine will preserve cucumbers for more than three months without scum spoilage. For short-period storage, a concentration of 0.03 percent is sufficient.

Tin Supplies

Stocks of tin in the U.S. have grown to the point where the government has dropped all but a hint of controls on use, inventory size, and import of the metal. A recent order, effective December, lifts controls on distribution, inventories, and import limits on the metal. Only remaining control, which also will be dropped shortly, requires

certain non-strategic users to report amounts on hand.

The good supply situation here, plus the fact that the British Board of Trade has been dumping excess stocks of the metal on the world market, has caused a heavy price drop, which has not yet leveled out. The recent steel strike, which reduced use of the metal materially, also had a big effect on declining prices.

Federated Women's Clubs "Resolve" On Bread

Members of the Federated Women's Clubs are being urged by the zealous leader of the committee on legislation, Mrs. Harvey W. Wiley, to exert their influence in favor of further regulation and standardization of bread. This committee has obtained approval by the D.C. Federation of a resolution critical of the use of "bread softeners and other non-nutritive ingredients, preservatives or substitutes."

Previously the General Federation at a New York session had passed a resolution which the Washington ladies regard as "too vague." They were critical of the national action on the ground that it neither mentioned bread specifically, nor did it criticize the use of softeners or emulsifiers in foods.

The vigorous feeling of these Washington leaders is evident from the warning which was, in effect, "that unless they demand a definition and stand-

(Industry News Continued)

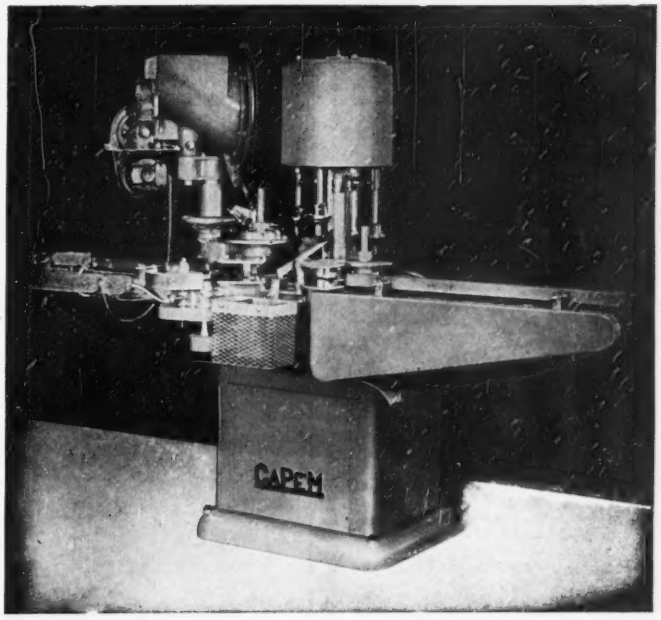
Harris & Ewing

Those Coffee Prices

When the House subcommittee got around to investigating balooning coffee prices, John C. Gardner, president, New York Coffee & Sugar Exchange, got his picture taken while explaining the boost was due to housewives' scare buying rather than speculation. And he blamed the scare on "inflammatory" stories in newspapers.

CAPEM

THE MODERN SCREW CAPPER



- Applies any type of standard screw cap or cover at speeds of 2000 to 10000 per hour.
- Takes container from conveyor line, applies cap perfectly, and returns container to conveyor AUTOMATICALLY without intermediate handling.
- Handles bottles, jars, cans or jugs of any size or shape.
- Delivers a perfect, LEAKPROOF seal at low cost.
- Available in 1, 2, 4, 6 and 8 spindle models.

Write for prices and delivery.

CONSOLIDATED PACKAGING MACHINERY CORP.
BUFFALO 13, N.Y.

KILLS PLANT MAINTENANCE ENEMIES

RUST FUNGUS DINGE

LIQUID PORCELAIN-LIKE DAMP-TEX

Damp-Tex super-enamel can be applied to surfaces despite moisture, heat, fumes and many other extreme conditions. Its water-proof film retards deterioration, increases efficiency, turns depressing, dingy interiors into gleaming, porcelain-smooth beauty. Resistant to fungus, 2% caustic solution, steam and lactic acid. One coat covers. Comes in white and colors. Used in over 4000 plants. Write for our trial offer !

Proved Fungus Resistant by FUNGUS TEST

Proved Lactic Acid Resistant by ACID TEST

LIQUID PORCELAIN-LIKE DAMP-TEX FOR WET OR DRY SURFACES

STEELCOTE MFG. CO.
ST. LOUIS 3, MO.

Canadian Manufacturer:
Standard Paint & Varnish Co.,
Windsor, Canada

ard of identity for bread and rolls, this sort of thing will go on until we'll be doing away altogether with the use of milk and fat products in bread, and will be paying for it with our health and doctor bills."

Washington observers do not believe that F&DA is going to modify its program significantly because of this enthusiasm of the Federated Women's Clubs. Already underway are plans which seem to be quite comprehensive in covering all of the basic principles relating to standards.

Nutrition Grants

George A. Sloan, president of The Nutrition Foundation, Inc., reported in mid-November that the Board of Trustees had approved 20 grants-in-aid totaling $117,000.00 to 13 universities.

Mr. Sloan stated that since 1942 the Nutrition Foundation has made 185 grants totaling $2,104,830.63 to 64 universities and medical centers in the U. S. and Canada.

USDA Research Changes

Charles H. Fisher has succeeded Walter M. Scott as director of the Southern Regional Research Laboratory, New Orleans. Dr. Scott, along with John R. Matchett, has been appointed assistant chief of USDA's Bureau of Agricultural and Industrial Chemistry and will serve in Washington as coordinator of the bureau's research on cotton and residues.

Dr. Matchett, formerly coordinator of food research at the Western Regional Research Laboratory, Albany, Calif., will coordinate the bureau's work on utilization of fruits and vegetables at the four regional laboratories, and at a number of bureau field stations throughout the country.

World News

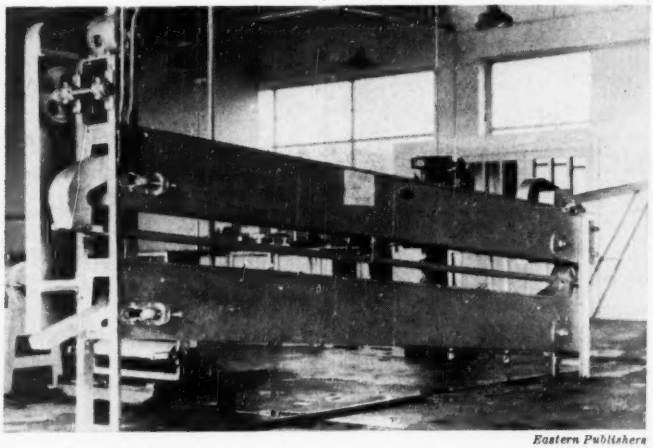
Spurt in Coffee Prices Boon to Latin America

RIO DE JANEIRO—Unprecedented coffee prices in New York have brought unexpected dollars to Brazil and strengthened the government's hope to liquidate commercial indebtedness by the end of 1949.

The black market dollar, bringing 33 cruzeiros in October, was worth only 28 early in November. Principal cause was that the huge coffee sales at high prices had put more dollars into the official market. With import licensing and exchange controls working fairly well, there was less demand for bootleg dollars.

Although Brazilian statistics on the balance of trade with the U.S. had been issued only through July, it was clear that this country in the last couple of months had been selling the U.S. much more than it bought.

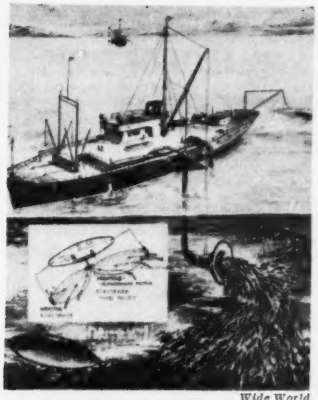
In this situation, the government was firm in repeating that the cruzeiro



Eastern Publishers

Aussie Cooker-Cooler

When two technologists from the Australian government's canning and investigating branch visited the U. S. some time ago, they kept their eyes wide open. Then they went home and developed this canned fruit cooker. It has halved the time for cooking and cooling the fruits, they claim, doing the job in two stages. In cooking stage, cans roll through regulated steam jets, after which they gravitate to lower section, where cold water jets complete operation.



Wide World

Russians Study Fishing

Here is an illustration from a Russian technical magazine, which says the project "is still in the research stage." If you want to know how it works, ask the Russians.

would not be devalued (the government buys dollars at 18.38 cruzeiros, sells dollars at 18.72 cruzeiros). It seemed likely the black market rate might drop even below 28.

The price rise also caught Colombian coffee men completely by surprise, and at a moment when political violence makes it doubtful whether the new crop can be gathered completely. As far as could be determined from Bogota in mid November, losses of the crop will be limited to some areas and will not be as widespread as some first reports made them appear.

In coffee growing circles, it is believed that the present high prices will be sustained until the second half of 1950, when new harvests come on the market. But it is also expected that good prices will continue, for about five years more, at least. Any considerable extension of coffee growing is not possible in Colombia, as coffee growing is limited to altitudes between 800 and 1800 meters and these regions are well stocked.

Continuous Butter Maker Gets Swiss Tests

ZURICH—The Escher Wyss Co. here is perfecting a new continuous butter-making machine claimed capable of turning cream into butter in one minute instead of the hour or more demanded by standard churns.

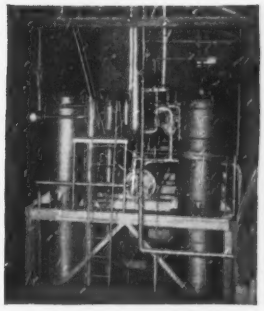
The company says the new machine transforms fresh cream into aluminum foil-packaged slabs of butter in eight minutes against the 40 to 60 hours

(Industry News Continued)

$260,000.00* saved in 3½ months with

mojonnier Lo-Temp Processing System

—second floor view



PROBLEM:

Florence Citrus Growers Ass'n., Florence Villa, Fla., operated a modern plant, producing high quality single-strength juice. The price of this juice was declining sharply. Also, can, carton and freight costs were rising. Profits fell off. How to use existing plant to produce a highly salable canned citrus juice—at lower cost?

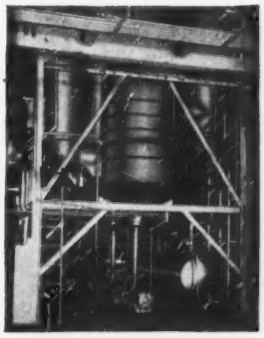
SOLUTION:

Converted from single-strength juice to frozen concentrate, using a complete Mojonnier Lo-Temp Citrus Processing System.

Model A Mojonnier Lo-Temp Evaporator in plant of Florence Citrus Growers Ass'n., Florence Villa, Florida. Unit has capacity of 375 gallons of concentrate per hour.

RESULTS:

- 500,000 boxes of fruit processed into 4 to 1 concentrate between March 1 and June 15, sold in advance at better margin of profit than possible with single-strength juice.
- $.45 per box of fruit saved on cans.
- $.071 per box of fruit saved on cartons.
- ***$260,000.00 saved on these two items alone during 3½ months of canning.**
- Freight costs reduced 7 times.
- More profit for grower, processor, jobber. Consumer demand constantly increasing.



—first floor view.

Mojonnier Lo-Temp Processing Systems are doing a big job on the frozen concentrate lines of leading American Processors. Consult with us now for all facts.

MOJONNIER BROS. CO., 4601 W. OHIO ST., CHICAGO 44, ILL.

there's
an easier way

there's also
an easier way
to clean
your equipment

OAKITE 1909 1949 40 ANNIVERSARY YEAR

Figuring out easy ways to speed-up sanitation in food plants is something Oakite has been doing successfully for fully forty years. Here's how we go about it:

Into your plant, at your request, comes your local Oakite Technical Service Representative. One of the first things he does is to check your water condition. Then he examines nature of soils to be removed. Checks your equipment for presence of water-line scale, slime, rust. Notes the various types of metals to be cleaned. With these vital facts in his possession, he prescribes a set of alkaline and acidic compounds that will exactly suit your particular needs.

Tailored-to-fit cleaning materials plus scientifically designed mechanical cleaning equipment are essential for fast, easy, economical plant sanitation. Here's why! A man in New York may need Oakite Composition No. 63 to clean a blancher, while a man in Texas may need Oakite Compound No. 32, and a California customer gets best results with Oakite Compound No. 84M to clean the same kind of unit. That's why things like water hardness, the kind of soil, sensitivity of the underlying surfaces, design of your equipment come in for so much attention by the Oakite Technical Service Representative. That's why Oakite offers over 80 materials specially designed to fit every condition.

Now, if you would like to have a recommendation on one or a hundred cleaning jobs, give us a call (or send coupon below) and we'll go to work on them at no cost to you. On the other hand, you might like to have the helpful literature listed below. No cost—just check your preference.

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Have Representative demonstrate. ☐
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☐ descaling
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☐ sterilization
☐ steam cleaning
☐ bottle and jar washing

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OAKITE

Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

MARCH OF DIMES

FIGHT INFANTILE PARALYSIS

JANUARY 16-31

Dimes March Again

Special significance is attached to this year's March of Dimes, since it follows the worst polio year on record. With cash reserves low, the drive, January 16 to 31, will be relied upon to provide funds to meet new epidemics and to continue the search for a polio preventive.

---

required by conventional systems for the same job. This speed-up is obtained by treating the cream with carbonic acid under pressure, and using a compressor which automatically reduces the granular butter to a homogeneous mass with the desired water content.

One of these machines—called Senn machines after their inventor—has been undergoing tests for several months at the Swiss Federal experimental station in Lucerne. Tests are unofficially reported to have been satisfactory so far. Another machine is under construction.

Here briefly is how the machine works: The fresh cream is centrifuged, pasteurized, and cooled in the conventional way. Then it is collected under pressure in a tank containing carbonic acid. From here is goes to the churn where it is whipped into granular butter in slightly less than a minute. Each globule of this butter is thoroughly washed in the churn and washing continues in the hardener into which the butter passes next. Still watery, the granular butter then is shunted into a compressor which squeezes it into a homogeneous mass with the desired water content. The butter is transferred automatically to a machine which cuts it into slabs weighing 100 or 200 g. and wraps them in foil.

(Industry News Continued)

JAMISON-BUILT DOORS

help Schaefer make better beer

Modern breweries demand the finest in equipment to assure the uniformly high quality of their product.

That is why Jamison-built cold storage doors were selected by The F. & M. Schaefer Brewing Company of Brooklyn, New York for the refrigerated rooms in the brewing process. For nearly 50 years, Jamison has been the leading builder of cold storage doors.

This has been due largely to consistently building doors of rugged, durable design that meet the requirements of refrigeration users.

The standard line of Jamison cold storage doors will meet the majority of user requirements for temperature, dimensions, application. Special door requirements can be built to specifications.

For full information and specifications, request Catalog 175.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

The oldest and largest builder of cold storage doors in the world

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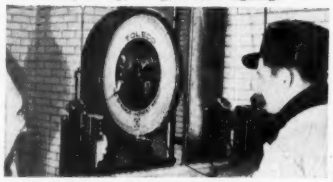
Scales today provide vital accounting data that *directly affects your costs* . . . and *profits!* That's why it's so important to *control your costs* with TOLEDO accuracy!

Your weight records originate at many points throughout your food plant—in receiving, shipping and in production departments—supplying basic information that affects your inventories, receivables, payables and the final profit figure!

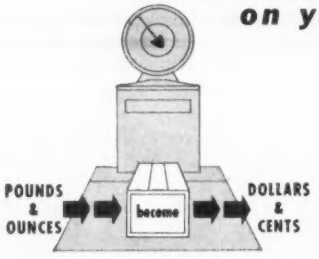
Toledo has the scales to start your cost records *right*—and improve product-quality! Whether it's receiving, batching, ingredient weighing, packaging or other weighing operations . . . look to Toledo. Get Toledo-engineered accuracy, speed and dependability all the way! Send for bulletin 2020 on Modern Weight Control. Toledo Scale Company, Toledo 12, Ohio.

OVER-UNDER SCALES – The Speedweigh saves time in packing, filling, check weighing.



SHIPPING AND RECEIVING SCALES – Toledo Accuracy prevents small errors from multiplying into big losses!

FOOD becomes MONEY on your SCALES!



Errors made at the scale stay wrong forever. There is no chance to recheck; either the food product has been shipped or has lost its identity in the general stock. You've got to be *right* — weigh it right with Toledo!

Guard Costs with **TOLEDO** *All the Way*

Biscuit Equipment Ban Set Up in India

NEW DELHI—No licenses for the import of biscuit manufacturing equipment for new factories will be allowed until late 1950, the Indian government has announced. The decision is reported to rest on the fact that the country's present capacity is adequate and no greater demands for imported grain would be permissible.

Schedule of Events

January

17–20—National Potato Chip Institute, 13th annual conference and exhibit; Netherlands Plaza Hotel, Cincinnati.

20—Rutgers University, ice cream manufacturers conference, New Brunswick, N. J.

22–31—Joint Conventions and Expositions; Auditorium, Atlantic City. 22-27—National Food Brokers Assn. 28–31—National Canners Assn. 28-31—Canning Machinery & Supplies Assn.

23–24—Canadian Food Processors Assn., annual convention; Ritz-Carlton Hotel, Montreal.

23–Feb. 4—Pennsylvania State College, short ice cream course for plant men; School of Agriculture, State College, Pa.

26–27—National Dairy Council, annual meeting-winter conference; La Salle Hotel, Chicago.

26–28—Refrigeration Research Foundation, annual meeting; Edgewater Beach Hotel, Chicago.

27—National Pickle Packers Assn., mid-winter meeting; Roosevelt Hotel, New York City. 28—Rally, Chalfonte-Haddon Hall; Atlantic City.

28–31—National American Wholesale Grocers Assn., annual convention; Ambassador Hotel, Atlantic City.

30–Feb. 2—American Warehousemen's Assn., 59th annual meeting, Edgewater Beach Hotel, Chicago.

31–Feb. 4—National Assn. of Frozen Food Packers & National Preservers Assn., all-industry convention; Congress Hotel, Chicago.

February

6–18—Pennsylvania State College, short course on market milk and milk supervision; School of Agriculture, State College, Pa.

11–14—Institute of American Poultry Industries, 20th annual fact-finding conference; Municipal Auditorium, Kansas City, Mo.

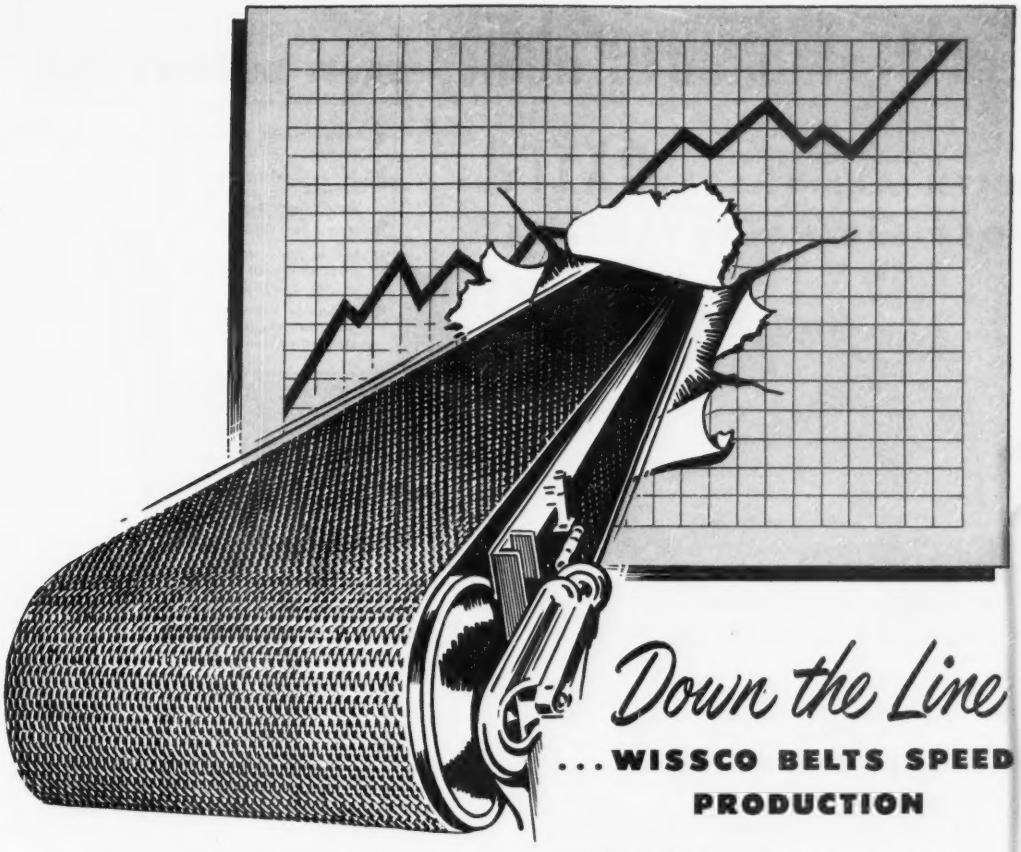
20–25—Pennsylvania State College, short course in testing milk, cream and other dairy products; College of Agriculture, State College, Pa.

March

6– 9—American Society of Bakery Engineers, 26th annual meeting; Edgewater Beach Hotel, Chicago.

27–29—American Dairy Assn., annual meeting; Morrison Hotel, Chicago.

—*End*



Down the Line

...WISSCO BELTS SPEED PRODUCTION

THOUSANDS OF MANUFACTURERS in scores of industries have found that Wissco Woven Wire Conveyor Belts speed production—cut costs. Time cycle, temperature and speed can be easily controlled and manual attention is reduced to minimum proportions.

Wissco Metal Conveyor Belts are the accepted standard for the heat treatment of metals, glass and ceramic ware and for processing of foods and other products. Whether your processing operation involves extremes in temperature, chemical action or other destructive factors, Wissco Belts are built to take it, for they are made of Monel, Stainless Steel, Bronze and other non-corrosive metals. They offer you these cost-cutting advantages:

Open Weave Construction—*Permitting free air circulation; free drainage.*

Extreme Flexibility—*Belts will operate over small diameter pulleys.*

Adaptability—*Built to withstand corrosion, abrasion, freezing or brazing temperatures.*

Simplicity of Design—*Easily made endless; readily repaired in case of accidental damage.*

Minimum Operating Costs—*Greatest load carrying capacity per unit weight and low thermal capacity mean fuel economy.*

Send for our illustrated booklet showing types and advantages of numerous conveyor belt constructions. And, if you have any questions on conveyor belts, their use and application . . . we will be happy to cooperate in solving your problem.

WISSCO METAL CONVEYOR BELTS ARE BEING USED IN:

Annealing Ovens, Baking Ovens, Brazing Furnaces, Canning, Ceramic Products, Chemical Processing, Decorating Glass, Dehydrating Food, Degreasing, Frozen Foods, Hardening Furnaces, Infra-Red Drying

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3. New Safety features.
4. Longer body without increasing overall length... greater load capacity.
5. Operating economy . . . powerful, rugged for all kinds of deliveries.

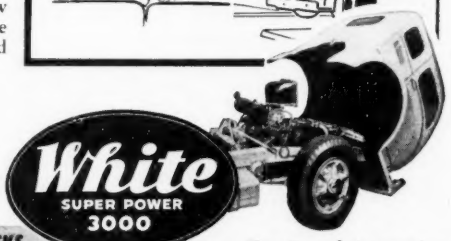
LIBBY'S famous food products are helped along to the grocer's shelf in the Chicago area by this great new White 3000. Narrow roadways, limited warehouse aisle space and congested Chicago traffic are real tests for the usefulness of this completely new truck which is saving time in every phase of delivery.

This new kind of truck is miles ahead for specialized delivery service because it sets a new standard in truck efficiency. Its functional design . . . its new weight distribution principle . . . its revolutionary approach to reducing truck maintenance costs—these are all exclusive advantages that make the new White 3000 a profitable investment that pays dividends for years.

And the White Quality which operators can measure in terms of fuel economy, low maintenance cost and long life, makes the new White 3000 your answer to today's truck problems.

Your White Representative will be glad to show you how the sensational new White 3000 can be profitably used in your business.

IMPROVED VISIBILITY IN ALL DIRECTIONS . . .
HELPS THE DRIVER BE A BETTER DRIVER



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THE WHITE MOTOR COMPANY OF CANADA LIMITED • *FACTORY AT MONTREAL*

White SUPER POWER 3000

Tips its cab to service

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

Changes in Food Supplies

Production

AMERICAN CHEESE output in October declined 17 percent under September and was 1 percent under October, 1948. Total for the month was 61,205,000 lb. Compared with the 1943-47 October average, however, production was up 4 percent. The September-October drop in 1948 was only 13 percent, while the five-year average seasonal decline was 14 percent.

ICE CREAM production, in October, estimated at 37,255,000 gal., was 4 percent above a year ago, but 14 percent smaller than the 1943-47 average for the month. The seasonal decline was 18 percent, which compares with a 34 percent drop in 1948, and a five-year average decline of 17 percent.

CREAMERY BUTTER turned out in October came to 103,130,000 lb. This was 12 percent more than was produced in October 1948 and 6 percent above the five-year average for the month. Seasonally, production fell 10 percent, compared with declines of 4 percent in 1948, and 11 percent in the five-year averages.

MARGARINE production totaled 72,569,000 lb. in October, which compares with 76,022,000 lb. in October 1948. The 1944-48 average for the month was 65,755,000 lb.

CANNED CORN packed in 1949 amounted to 29,795,000 cases on a 24/2's basis, according to the National Canners Association. The 1948 pack reached 31,483,000 cases.

CANNED PEACHES produced in 1949 totaled 19,154,971 cases on a 2½'s basis, in the NCA compilation. This compares with 17,381,000 cases packed the previous year.

Materials

CUCUMBER crops were placed at 11,806,000 bu., in the BAE preliminary estimates, which is about 20 percent above the 1948 harvest of 9,847,000 bu.

PIMIENTOS for processing were estimated at 23,300 tons, approximately 30 percent more than the 1948 output of 17,880 tons.

GREEN LIMA BEANS for canning, freezing and other processing, were estimated at 82,210 tons, exceeding the 1948 harvest of 68,780 tons by about 17 percent.

SPINACH for processing should reach 79,020 tons, a 63 percent advance over the 1948 harvest of 48,540 tons.

Stocks and Storage

Stocks of selected fruits and vegetables in canners' hands, November 1, are here compared with Nov. 1, 1948 stocks. Compilation is in actual cases. (Add 000):

	Nov. 1 1949	Nov. 1 1948
Sweet corn	29,030	22,563
Peas	15,757	18,510
Red pitted cherries	1,296	1,070
Sweet cherries	860	264
Apricots	1,978	3,355
Baby foods	49	42

FROZEN FISH AND SHELLFISH in storage November 1 reached 157,553,774 lb., which compares with 150,507,730 lb. held a month earlier, and 148,049,055 lb. in storage Nov. 1, 1948.

COLD STORAGE occupancy in public warehouses increased 7 points during October to reach 67 percent on November 1, the high point for the year.

FREEZER occupancy stood at 70 percent on November 1, an increase of 3 points over October 1. While both cooler and freezer occupancy remained below average, they were much improved over recent months.

Indexes

Business Week's index of business activity jumped to 186.6 for the week ending December 3, from 183.2 the week before and 158.1 a month earlier. A year earlier it was 199.1.

THE COMMODITY INDEX on foods, compiled by the *New York Journal of Commerce*, was 173.3 for the week ending December 9, compared with 174.1 for the previous week, 177.0 for November, and 184.2 for December, 1948.

CONSTRUCTION

	Pending (thousands)	Awarded December (thousands)	Total Awarded 1949 (thousands)
Bakery	$1,125	$150	$7,501
Beverages	690	2,650	18,754
Canning and Preserving	....	....	115
Cold Storage	70	360	2,859
Confectionery	....	....	1,547
Grain Mill Products	450	137	32,776
Ice, Manufactured	300	....	75
Meats and Meat Products	136	335	8,347
Milk Products	145	290	8,889
Miscellaneous	1,750	3,564	18,422
	$4,666	$7,426	$99,285

Low Cost Fortifiers Help Meet Tougher Competition!

ONE added low cost nutritional fortifier can spark advertising and sales... provide fresh appeals to consumers... put you far ahead of your competitors!

One of our technical men will be pleased to consult with you. No obligation! Special Products Division, STANDARD BRANDS INCORPORATED, New York 22, N. Y.

VITAMIN D PRODUCTS: Hy-Dee Irradiated Dry Yeast, Irradiated Dry Yeast Type 700-H, Viosterol (Irradiated Ergosterol).

NATURAL B-COMPLEX PRODUCTS: Pure Primary Dry Yeast (brewers' type), Bee-Flex Products, Yeast Extracts, Yeast Extract and Liver, Fortified Yeast with Iron.

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"First For Food Fortification"

"Our best ads are installed..."

A battery of 20 14' x 25' wood stave tanks

COOLING TOWERS
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Raspberry
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Grape
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Cherry
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Apricot

Our flavor catalogue is now available

These flavors represent the first commercial application of a series of original discoveries made in our laboratories in the course of long-term, advanced research.

Remarkable duplications, previously unknown, of the flavors and odors of natural compounds have been achieved through newly acquired, exact knowledge.

Concentration in these materials has been carried to a very high degree, far surpassing previously known limits in many cases. More than half of them are used, under ordinary circumstances, in a ratio of about one part to ten thousand.

The high standards of uniformity possible in laboratory-controlled, synthetic construction is a fundamental characteristic of the entire group.

These are specialized flavors, designed expressly for use in industry. Manufacturers are finding them of immediate, dollars-and-cents value.

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Men, Jobs, Companies

GILBERT C. SWANSON has been named president of G. A. Swanson & Sons, Omaha, to fill vacancy created by the sudden death of his father. Since joining company in 1926, he has worked in all phases of the business, and most recently was manager of production.

DR. HARRY COHEN is now head of Chicago research department of Florasynth Laboratories, Inc. As company consultant, he will assist customers with manufacturing problems. He studied at the Universities of Illinois and Wisconsin, as well as Cal. Tech.

H. E. MEINHOLD, since 1931 executive vice-president of Duffy-Mott Co., Inc., has been named president and board chairman to succeed his father, the late Henry Meinhold. His election marks first change in top executive since company was formed in 1914.

ALLYN C. BEARDSELL, formerly headquarters supervisor of merchandise packaging and warehouse methods with Western Electric Co., has resigned his post to accept an appointment to staff of Container Laboratories, Inc., of New York, San Francisco and Chicago.

Industry

Associated Independent Corn Canners announces election of the following new officers: John Kraemer, president; G. Bartel Silver and Reynold Peterson, vice-presidents; Edward Dunlap, treasurer; and Byrne Marcellus, secretary-treasurer. Organization has plans for national long range merchandising program.

American Institute of Baking, Chicago, has received appropriations to equip some of its new laboratories. The New York Bakers Club has given $25,000 to furnish the pilot and experimental bake shop. The New England Bakers Association will donate equipment for bacteriological studies in one of the research laboratories; and Helms Bakeries, Los Angeles, will completely equip the new Kjeldahl lab.

American Bakeries Co., Rocky Mount, N. C., has announced plans for construction of a new baking plant to cost about $1,000,000.

Carhill, Inc., Chicago, has awarded contract for a 7,000,000-bu.-addition to its present 10,500,000-bu.-capacity grain elevator.

Clinton Industries, Inc., St. Louis, recently changed its name to Clinton Foods, Inc. Company also elected J. I. Moone and B. C. Skinner as vice-presidents.

California Fruit Growers Exchange plans to start production of frozen orange juice concentrate at its Exchange Orange Products Co. plant, Ontario, Calif.

T. H. Estabrooks Co., Montreal, Canada, is reported centralizing its operations in a newly constructed $300,000 plant.

M. K. Goetz Brewing Co., St. Joseph, Mo., plans to resume the manufacture of "near beer" of prohibition days. The brew is expected to prove popular in meeting the demands of drinkers in dry states.

Grant Packing Corp. has been formed to operate a $750,000 frozen citrus concentrate plant at Plant City, Fla. Privately financed, the firm is headed by J. W. Horsey of Toronto, Canada, and St. Petersburg, Fla. Plant will have a rated capacity of 1,130,000 gal. of juice per 140 days.

Koerber Brewing Co., East Toledo, Ohio, has suspended operations pending reorganization. The 46-yr.-old brewery has a rated capacity of 140,000 bbl. Since the war, the firm had spent about $350,000 on an extensive modernization and construction program.

Maumee Preserving Co., Toledo, Ohio, is now manufacturing a line of mustard and pickles to be sold under the Maumee-brand label. Firm was originally in the distributing business, but recently purchased processing equipment from the Harbauer Co. plant, now being dismantled.

McGough Bakeries Corp., Birmingham, Ala., plans a $300,000 modernization program.

Richstone's Bakery, Ltd., Montreal, Canada, has started a $50,000 extension to its present facilities.

Santa Clara Packing Co. is constructing a large, modern plant at San Jose, Calif.

Sunshine Biscuits, Inc., New York City, announces details of a large-scale "better housing" program for the company. Plans call for construction of branch distribution warehouses from coast to coast.

Joseph E. Seagram & Sons, Ltd., Waterloo, Ont., Canada, subsidiary of Distillers Corp. Seagrams Ltd., is building a $1,000,000 rack-warehouse extension to its plant.

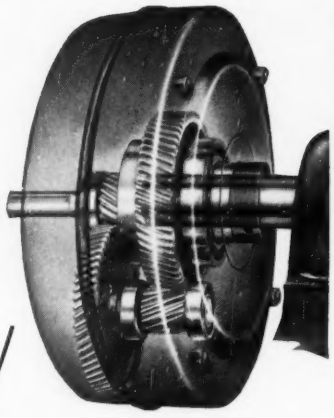
Shen-Valley Meat Packers, a cooperative plant at Timberville, Va., recently dedicated its new $1,500,000 building.

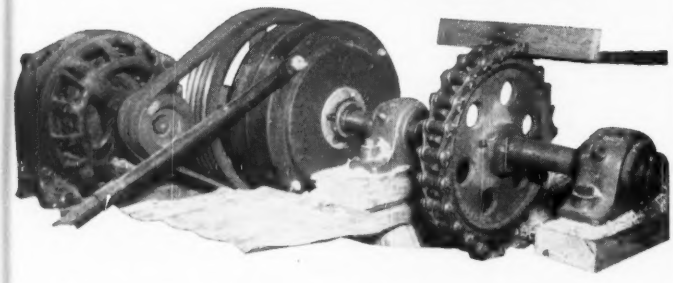
Sucher Packing Co., Dayton, Ohio, recently installed a new cutting floor. It handles a capacity of 1,000 hogs a day.

(Men, Jobs, Companies Continued)

Get AMERICAN Reduction Drives

FLEXIBLE!
FROM STOCK!
for speeds under 154 R.P.M.





Every component of the American Reduction Drive is a STANDARD item available from distributors' stocks! By using STANDARD reducers, STANDARD motors, STANDARD V-belts, and STANDARD sheaves, your slow-speed problems are solved. Here are remarkable economies: Lower in first cost. Less expensive to install (no bulky supports or foundations). Less expensive to maintain. Six sizes of Reduction Units give you any speed below 154 r. p. m. for drives up to 25 h. p. This drive is different because the reducer is mounted directly on the shaft of the driven machine—PUTTING THE GEARS WHERE THEY BELONG—*on the slow-speed end of the drive!* Over 50,000 installations prove its ability to cut costs.

The American Pulley Company • **4266 Wissahickon Ave. • Phila. 29, Pa.**

AMERICAN REDUCTION DRIVES

SEND PROOF . . .
. . . on how to STANDARDIZE my slow-speed installations. Please rush my free copy of The American Drives Data Book.

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COMPANY _____
ADDRESS _____
CITY _____ STATE _____

WILLIAM B. BRADLEY, head of the American Institute of Baking laboratories since 1945, was recently appointed scientific director to succeed Dr. Franklin C. Bing, resigned.

Personnel

Herbert E. Apple, Jr., has been appointed assistant general manager of production for the Birds Eye-Snider Division of General Foods Corp. Succeeding him as eastern production manager will be John M. Seaman.

Thomas W. Balfe, vice-president and director of sales of National Distillers Products Corp., was elected president of the White Rock Corp., wholly owned subsidiary of National Distillers. He succeeds H. I. Peffer, who becomes chairman of the board.

DeWitt L. Beach has been appointed manager of the Buffalo plant of Continental Baking Co. He takes the place of Terrelton E. Smith, who has been transferred to manage the firm's Jamaica, Long Island, plant.

W. Harold Brenton, Des Moines, Iowa, was recently nominated as a director of Swift & Co., Chicago.

H. O. Breuer has been appointed by the Syntomatic Corp., New York City, to represent the firm in Mexico and Central America.

Ralph B. Brenan, formerly president and managing director of T. H. Estabrook Co., has been named managing director of G. E. Barbour Co., St. John, New Brunswick, Canada.

L. E. Clifcorn, director of the products and processes research division, Continental Can Co., Chicago, has been elected chairman of the Division

(Men, Jobs, Companies Continued)

SIMPSON *Intensive* MIXERS

. . . a better, faster solution to difficult

SPICE BLENDING

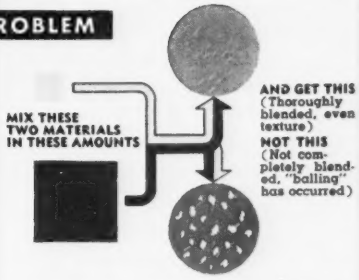
PROBLEM
MIX THESE TWO MATERIALS IN THESE AMOUNTS
AND GET THIS (Thoroughly blended, even texture)
NOT THIS (Not completely blended, "balling" has occurred)

Diagram shows how a minute proportion of one material is thoroughly blended with a large amount of another in a Simpson Intensive Mixer (top circle) as compared to ordinary mixing methods (bottom circle).

A large midwest spice manufacturer had difficulty in uniformly mixing and blending a proportionately small amount of Cream of Spice into a carrier. The seasoning was not thoroughly dispersed in the carrier in the first mixing operation in a ribbon type mixer, and a time-consuming grinder operation was necessary to complete the dispersion. A Simpson Intensive Mixer was installed and, in a single operation, thorough, more rapid blending was accomplished.

Simpson Intensive Mixers are being used in a wide variety of food processing applications, in capacities from ⅕ to 50 cu. ft. Let a National Engineer show you how these versatile mixers can cut costs and improve quality.

THE MULLING PRINCIPLE OF MIXING

The unique "mulling action" of a Simpson Intensive Mixer is comparable to the rubbing, kneading and smearing action of a mortar and pestle. This kind of mixing action eliminates any "balling" of materials and quickly effects a thorough dispersion of the elements in the mix. The result is a finished product of uniform quality. Because of the positive control obtained throughout this process, it is known as "Controlled Mixing."

SIMPSON *Intensive* MIXERS

NATIONAL *Engineering Company*

614 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia

355 ways to CUT
Industrial Wheel and Caster
INVENTORIES

This NEW Aerol Manual Tells You How

Yours for the asking

Compiled after exhaustive research Hundreds of specific problems confronting actual users of materials handling equipment were studied. The solutions to these problems and the resulting developments form the basis of the AEROL MATERIALS HANDLING MANUAL.

Detailed illustrations Extreme care was used in the preparation of all photographs and drawings which illustrate our products and the problems they solve.

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Additional information Helpful hints about each product, in addition to technical details, help you find new uses for our products that save money and increase efficiency.

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AEROL WHEELS ★ CASTER RIGS ★ HAND TRUCKS

DR. W. HASSID, professor of plant nutrition in the University of California, Berkeley, has been elected chairman of the ACS's division of sugar chemistry and technology. He succeeds Dr. W. W. Pigman, associate professor of chemistry at U. of Alabama.

of Agricultural & Food Chemistry, American Chemical Society. He succeeds Carl R. Fellers.

George S. Coble has been re-elected president and treasurer of Coble Dairy Products, Inc., Lexington, N. C.

W. J. Henning was appointed a director and assistant general manager for Eastern Canada for Robin Hood Flour Mills, Ltd., Montreal, Canada.

Marvin H. Walker, former general manager of the Florida Citrus Commission, has been elected general manager of the Florida Citrus Canners Cooperative.

Associated Industry

Allis-Chalmers has named Max L. Murdock manager of the centrifugal pump department at its Norwood, Ohio, plant. He succeeds H. C. Gaton, retired.

The Day Co. of Minneapolis has opened a sales and service office in Chicago under the direction of Frank F. Vytlacil.

The J. H. Day Co. and **Day, Inc.** of Cincinnati, bakery machinery makers, have been sold for $3,500,000 to a corporation headed by Martin H. Miller, formerly vice-president of American Machine & Foundry Co. of New York. Name of firm will henceforth be J. H. Day Co., Inc.

(Men, Jobs, Companies Continued)

UNITED packages are not alike. Each one is engineered specifically to fit your needs and requirements. Each one is designed to your individual product. UNITED never designs packages "alike as two peas in a pod."

UNITED *Packages are:*

labor saving	*set up quickly*
skillfully engineered	*product recognition*
time saving	*fill freely*

WRITE, WIRE OR PHONE UNITED TODAY, WE ARE READY TO SHOW YOU WHY
IT PAYS TO PACKAGE WITH UNITED

UNITED BOARD & CARTON CORPORATION

Folding Cartons and Package Specialties From Pulp to Finished Product

P. O. BOX 1318, SYRACUSE, NEW YORK

CARTON PLANTS: VICTORY MILLS, SYRACUSE, COHOES, BROOKLYN, N. Y., SPRINGFIELD, O.; BOARD MILLS: LOCKPORT, THOMSON, N. Y., URBANA, O.

A New Improved UNIVERSAL COLLOID AGENT

IT SUSPENDS...
IT GELS...
IT EMULSIFIES...
IT STABILIZES...
IT THICKENS...

We are now producing from Carrageheen two new improved types of gelose. One of them should be the answer to your emulsifying, suspending, thickening or stabilizing problems.

KRIM-KO GEL is an all-purpose colloid-assistant. Properly used, it has been proved effective in many of the most exacting food, pharmaceutical and industrial applications.

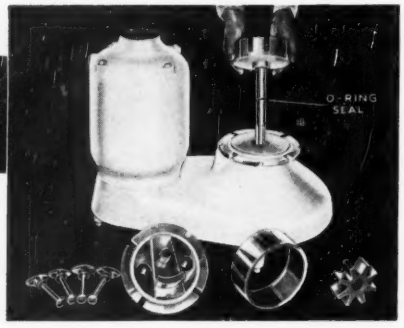
CARRAGAR is an agar-type gelatin which forms tender, fruit-like gels over a wide pH range. It does not require acidulation to produce desired results.

Send for free liberal working samples for experimental use.

KRIM-KO Corporation
SEAPLANT PRODUCTS DIVISION
NEW BEDFORD, MASS.

VIKING "Sanitor"

SO QUICK, SO EASY . . . To Take Down and Clean!



Features You Want
Positive displacement pump.
Smooth, even flow.
Fewer parts.
Self priming.
Meets 3A sanitary pump standards.

To remove the pump from power and drive assembly — just pick it up — nothing to loosen. It's ready to move to central cleaning. If you prefer, dismantle the unit where it is. Just 5 large, simple parts, and "O" ring seal and 4 clamp screws.

You save time and expense with this new *all sanitary* pump.

Ask for free bulletin D100E. It gives you the complete story.

VIKING
AN HONORED NAME IN PUMPING

See Our Catalog In SWEETS

Viking PUMP COMPANY
Cedar Falls, Iowa

Men, Jobs, Companies

Robert Gair Co., Inc., New York City, has appointed George B. Greenwood as manager of industrial relations department and Irving S. White as manager of the industrial engineering department.

General Controls, Glendale, Calif., announces opening of new factory branch office facilities in Minneapolis, Buffalo, and Baltimore.

Hyster Co., Portland, Ore., has named William H. Kilkenny general manager of the firm's Huntington Park, Calif., office.

MRM Co., Inc., Brooklyn, has appointed Samuel S. Smith as general manager of the liquid filling equipment division.

Mack Trucks, Inc., New York City, has named Albert G. Crockett manager of distributor sales for Mack-International Motor Truck Corp.

Read Machinery Division of The Standard Stoker Co., Inc., York, Pa., announces appointment of Leslie R. Pabst as factory representative in the states of Missouri, Kansas, and Nebraska.

Renew Filter Co., Chicago, announces appointment of Ernest J. Rosado as special representative for its new vacuum fat filter.

Deaths

Thomas S. Ferrell, secretary of Coca-Cola Co. (Thomas), Inc., Chattanooga, and president of the Coca-Cola Bottling Works, Greenwood, Miss.—Nov. 15, at a Chattanooga hospital following a short illness.

Charles Herendeen, 90, retired president of Charles Herendeen & Sons, Inc., Chicago flour millers—Nov. 7 in Chicago.

Clarence Norman Lovell, 75, president of Lovell & Covel Confectionery Co., Cambridge, Mass.—Nov. 8 at Melrose, Mass.

Griffith H. Riddle, president and research director of the Research Foundation, Inc., New York City—Nov. 27 at his New York residence after a long illness.

Charles T. Wegner, 57, founder and president of Jel Sert Co., Chicago—Nov. 6 in Miami, Fla., after a long illness. —*End*

STURTEVANT *Whirlwind* AIR SEPARATORS

CUT PRODUCTION TIME AND COSTS

- **Increase production of Fines up to 300%**
- **Capacities from 1/4 to 50 Tons per hour**
- **Finenesses from 40 to 325 mesh and finer**

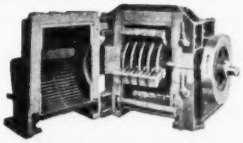
Large or small plants can increase output of accurately sized dry materials and cut costs, too, with Sturtevant Whirlwind Air Separators.

These highly efficient separators select a continuously uniform product of any desired fineness from 40 to 325 mesh and finer. Used in combination with mills, they will increase production by as much as 300% . . . cut power costs up to 50%.

Large feed opening, rugged construction, ease of adjustment, low power consumption assure economy of operation and minimum upkeep. Write for Bulletin 087 today.

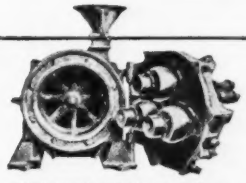
STURTEVANT MILL CO.

106 CLAYTON STREET, BOSTON 22, MASS

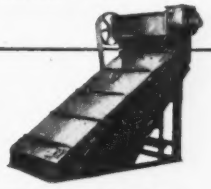


SWING-SLEDGE MILLS for coarse and medium reduction (1" to 20 mesh.) Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

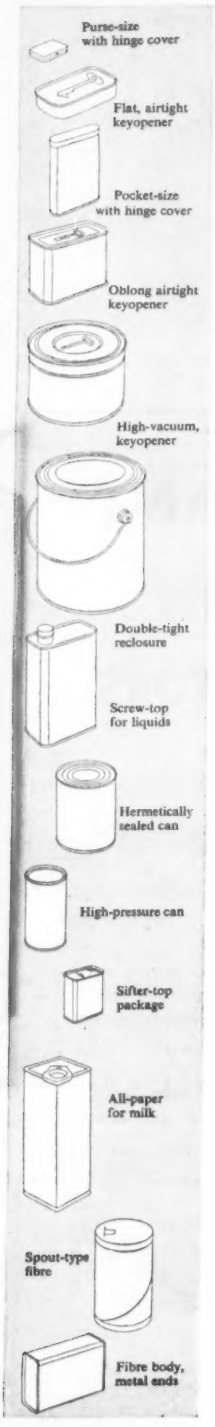
ROTARY FINE CRUSHERS for intermediate and fine reduction. (1" to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers. Many sizes.



RING ROLL MILLS for medium and fine reduction (10 to 200 mesh) hard or soft materials. Operate in closed circuit with Screen or Air Separator. Open door accessibility. No scrapers, plows, or shields.



MOTO-VIBRO SCREENS screen anything screenable. Classified vibrations. Unit construction—any capacity. Open door accessibility. Open and closed models with or without feeders. Many types and sizes—½" to 60 mesh.



VERSATILITY..that may solve a packaging problem for you

On this page you see thirteen different types of containers, adaptable to hundreds of different packaging problems and in actual use by scores and scores of different industries.

What you do *not* see here are the many *other* types of containers pioneered and developed by Canco.

Now—add it all up—and you get *versatility*, the art of being many-sided, in creating packages for hundreds of specific packaging problems.

This art has been practiced by Canco since 1901.

There is hardly a major development in metal and fibre packaging that this keen, alert organization has not pioneered.

When you remember that Canco service also includes advice on processes, filling, closing, label design, and marketing, you can see that there are definite advantages to doing business with a versatile package manufacturer.

CALL CANCO FIRST

AMERICAN CAN COMPANY

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Books

Milk Bacteria

PRACTICAL DAIRY BACTERIOLOGY. *By Paul R. Elliker. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.,* 1949. 391 pages; 6½ x 9¼ *in.; cloth. Price,* $4.

The fundamental and leading role bacteriology plays in the production, processing, and distribution of dairy products is emphasized in this latest addition to the McGraw-Hill series on agricultural sciences.

In the first four chapters, the nature and activity of microorganisms commonly found in milk are explained. From there on, the book deals with the microbiology of the various dairy products. Methods for determining the sanitary quality of milk and milk products are also discussed.

This little volume provides a practical guide to dairy bacteriology and should be valuable to dairy plant workers, inspectors, fieldmen, and dairy farmers.

Facts and Figures

DE LAVAL ENGINEERING HANDBOOK. *Edited by Austin H. Church and Hans Gartmann. Published by De Laval Steam Turbine Co., Advertising Dept., Trenton 2, N. J.,* 1949. 265 *pages;* 5¾x8 *in.; Leather compound. Price,* $2.

Designed to facilitate the work of power plant, industrial and design engineers, this handbook of reference data, information and formulas is divided into these seven main sections:

General information and data, steam turbines, centrifugal pumps, IMO pumps, centrifugal compressors, helical reduction gears, and worm reduction gears.

Applied Science

INDUSTRIAL CHEMISTRY, *Fifth Edition. By Emil Raymond Riegel. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y.,* 1949. 1,015 *pages;* 6¼x9¼*in.; cloth. Price,* $7.

In a work devoted to the fundamentals of applied chemistry, the sweeping wartime developments offer a profound challenge. This fifth edition, therefore, stands with the first in its value to the general reader.

The primary purpose of the author and his collaborators has been to present a picture of an industry, a process, or an installation such as might be gained by the reader's personal study. And where pertinent, the author describes the developments—from basic chemical reactions to finished products.

Food chemists will find their own field represented by such basic studies as those on sugars; water, and industrial waste disposal; yeast activity; animal and vegetable oils and fats; and essential oils. But of equal value to any chemist—and to the non-technical reader—is the glimpse of the whole of the chemical industry and the rich references provided by this work.

Dr. Riegel is professor of industrial chemistry at the University of Buffalo.

Study in Oils

THE ESSENTIAL OILS, *Volume 3. By Ernest Guenther. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y.,* 1949. 777 *pages;* 6¼x9¼ *in.; cloth. Price,* $10.

Monographs on individual oils make up this third volume. They describe the origins of the oils, plant cultivation, technics of distillation, yield, properties and composition, total production, and industrial uses.

Only those oils that are technically important and actually used in the industry, or that have commercial possibilities, are included. The author has utilized not only his own long experience in the field, but that of Fritzsche Bros., of which he is technical director, along with the assistance of planters, producers of essential oils, and dealers throughout the world.

Government Publications

THE WORLD SUGAR SITUATION. *U. S. Department of Agriculture. September* 1949. *Unnumbered document.* A review of present supply and consumption factors, with complete world statistics.

METHODS OF DETERMINING THE OIL CONTENT OF TUNG FRUITS AND FACTORS AFFECTING IT. *U. S. Department of Agriculture. Circular No.* 806 *Price,* 10c.

MILK-PRODUCTION VALUE OF A CONCENTRATE MIXTURE COMPOSED ENTIRELY OF SOUTHERN AGRICULTURE BY-PRODUCTS. *U. S. Department of Agriculture. Circular No.* 811. *Price,* 5c. Shows important feed markets available for food plant byproducts.

TESTING MILK AND CREAM. *By P. A. Wright. U. S. Department of Agri-*

No Error!

Simply place an ATI Cook-Chex retort tag on each basket before cooking. When tag turns green, you *know* the food is fully cooked.

No Worry!

ATI Cook-Chex retort tags are unfailingly accurate. They guarantee you against human error. They safeguard consumer good-will and company profits.

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ATI Cook-Chex prevent waste or spoilage, and they cost so little. Less than 1/50¢ per case.

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Gerber's Baby Foods
Gorton-Pew Fisheries Co., Ltd.
Grocery Store Products Co.
Hunt Foods, Inc.
Illinois Canning Co.
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Let's get together on your mixing problems today! Send full details to SPROUT, WALDRON & CO., 35 Waldron St., Muncy, Pa.
SPROUT WALDRON
Manufacturing Engineers
MUNCY PENNSYLVANIA

culture. Miscellaneous Publication No. 161. *Price,* 15c. Revised 1949 edition. Approved official test methods. A comprehensive pocket manual.

SYRUP TREATMENT OF APPLE SLICES FOR FREEZING PRESERVATION. *Bureau of Agricultural & Industrial Chemistry. AIC-253. Mimeographed.*

PUBLICATIONS AND PATENTS OF THE EASTERN REGIONAL RESEARCH LABORATORY, 1939—JUNE 1949. *Bureau of Agricultural & Industrial Chemistry. AIC-180, including Supplements* 1, 2, *and* 3. *Mimeographed. Request from Eastern Regional Research Laboratory, Philadelphia* 18, *Pa.* A revision including original issue of this bulletin and supplements which have been issued before.

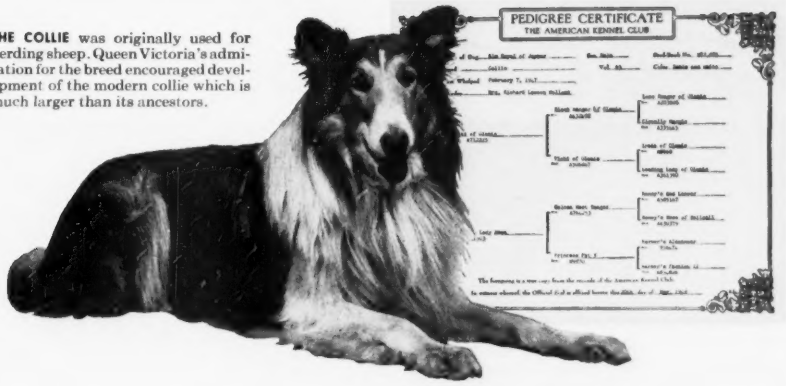
COLLECTIVE BARGAINING PROVISIONS; UNION-MANAGEMENT COOPERATION, PLANT EFFICIENCY, AND TECHNOLOGICAL CHANGE. *Bureau of Labor Statistics, Department of Labor. Bulletin No.* 908-10. *Price,* 25c.

DAIRY PRODUCTS. *FAO Commodity Series. Bulletin No.* 16. *Price,* 50c. *Available from either Food & Agriculture Organization,* 1201 *Connecticut Avenue, N. W., Washington* 6, *D. C., or Columbia University Press,* 2960 *Broadway, New York* 27, *N. Y.*

FATS AND OILS. *FAO Commodity Series. Bulletin No.* 13. *Price,* 50c. *Available from either Food & Agriculture Organization,* 1201 *Connecticut Avenue, N. W., Washington* 6, *D. C., or Columbia University Press,* 2960 *Broadway, New York* 27, *N. Y.*

PRODUCTION DATA. *Census of Manufactures,* 1947. Data for all industries are now available in pamphlet form. Later, these pamphlets are to be assembled in the bound volumes which will be the permanent census record. Of interest immediately to food technologists are the following booklets, at the prices indicated: MC20A Meat products (10c.), MC20B Dairy products (10c.), MC20C Canned and preserved foods (10c.), MC20D Grain-mill products (10c.), MC20E Bakery products (10c.), MC20F Sugar; confectionery and related products (10c.), MC20G Beverages (10c.), and MC20H Miscellaneous food products (10c.).

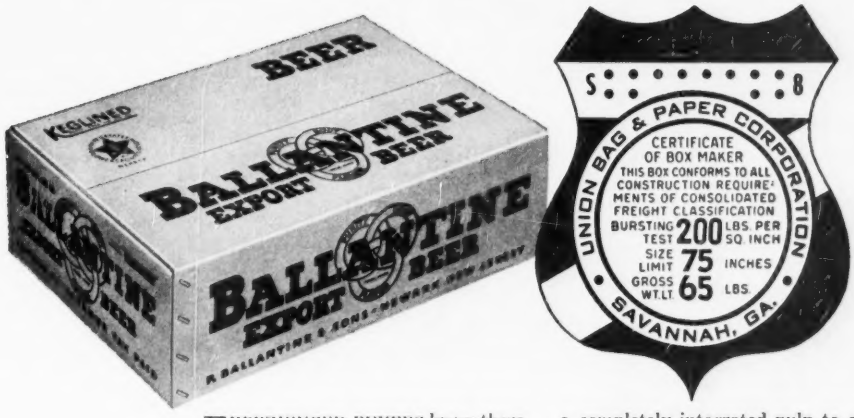
The above recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, *D. C. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue.* —End



THE COLLIE was originally used for herding sheep. Queen Victoria's admiration for the breed encouraged development of the modern collie which is much larger than its ancestors.

Take No Chances—

Buy Boxes By Their Pedigree



EXPERIENCED BUYERS know there is *extra* assurance in buying boxes with a pedigree.

That's why P. Ballantine & Sons rely on Union boxes to carry great quantities of their famous beer and ale from brewery to dealers' shelves.

Many other makers of national brand merchandise know the Union shield on a box means it is made by the leader in Kraft packaging, operating five of the world's largest paper machines in a completely integrated pulp-to-container plant. Linked with this great plant are tremendous forest resources and four modern box plants—and one management with one high standard of quality control supervises everything from timber to finished box.

That is why makers of many national brand products know that Union corrugated boxes give *extra* assurance of consistent quality, consistent service and fair price.

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***Corrugated Container Plants:* SAVANNAH, GEORGIA • CHICAGO, ILLINOIS • TRENTON, NEW JERSEY**

Creative Package Design

this corrugated prepak*

Protects... merchandises the product ...displays well... adds color... prompts impulse purchases... stimulates take-with sales... saves rewrapping time, labor and materials... conserves selling space... serves as storage box. Goods are sold from floor sample, delivered from stock to simplify transaction, minimize handling. To win dealer enthusiasm and consumer approval, give YOUR products *package action*. Consult Hinde & Dauch, Executive Offices, 5005 Decatur St., Sandusky, Ohio.

*Reg. U.S. Pat. Off.

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Catalogs, Bulletins

Food Plant Equipment

Electric Heaters

Strip, ring, tubular and cartridge type electric heaters in a variety of voltages, wattages and sheath materials are listed and pictured in Catalog 50. Data for selection and application are given in this 50-page book.—*Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8.*

Squirrel-Cage Motor Starter

Oil-immersed wall-mounted starter for control of squirrel cage motors and the primary of wound rotor motors is covered in Bulletin 14B7274. Starter is completely sealed and corrosion-resistant.—*Allis-Chalmers Mfg. Co., 1126 S. 70 St., Milwaukee.*

Counting and Marking

A machine that accurately counts and marks labels and coupons at speeds up to 1,000 per min. is offered in Tickometer bulletin.—*Pitney-Bowes, Stamford, Conn.*

Compression Distillation

Distillation without heat at low cost, with simple operation, flexibility, and no necessity for cooling water is possible with compression stills detailed in folder.—*Arthur D. Little, Inc., 30 Memorial Drive, Cambridge, Massachusetts.*

A-C Generators

Non-technical language in Bulletin 2200-PRD-196 tells what to look for when ordering generators. Recent installations are shown. —*Electric Machinery Mfg. Co., Minneapolis 13.*

Heat Unit for Process Work

For drying towers, spray booths or drying rooms, direct-fired heater employs forced air circulation to give temperatures up to 500 deg. F.—*Prat-Daniel Corp., East Port Chester, Conn.*

Cooling and Freezing

Installations of freezing and refrigerating units in cold storage, locker, dairy, and fisheries plants are illustrated and described in Vol. 21, No. 2 of house organ, *Frick System.* —*Frick Co., Waynesboro, Pa.*

Tubular Exchangers

Comprehensive 94-page book, *"Standards of Tubular Exchanger Manufacturers Assn.* is being offered at cost, $3.00. Book covers design, operation and maintenance of tubular heat exchangers.—*Tubular Exchanger Manufacturers Assn., Inc., 53 Park Pl., New York City 7.*

Marking Machines

Loaded or flat cartons, multi-wall bags, and wooden shooks can be marked on conveyor lines or by hand with units detailed in 8-page leaflet.—*Industrial Marking Equipment Co., Inc., 7 E. 48 St., New York City 17.*

Flexible Dryer

Grain and other non-powdered materials can be dried efficiently at low cost in dryer detailed with specifications in 10-page folder—*Arid-Aire Mfg. Co., 424 Second Ave. S., Minneapolis 1.*

Centrifugal Blowers

Single-stage and multi-stage centrifugal blowers and exhausters are covered in 24-page Bulletin 120-B-14. Regulating devices for the apparatus are also described.—*Roots-Connersville Blower Corp., Connersville, Ind.*

Double-Lap Tray Ovens

Automatic tray unloader and fuel economy are features of double-lap tray ovens described in Bulletin DM-683.—*American Machine & Foundry Co., 485 Fifth Ave., New York City 17.*

Super-Centrifuge

Basic information on the centrifuge principle, operating features, and specifications on all models of super-centrifuges for general or special application are included in Bulletin 1248.—*The Sharples Corp., 2323 Westmoreland St., Philadelphia 40.*

Materials Handling

Mobile Equipment

Casters, dollies, platform trucks, tank (arc-welded and galvanized), rack, and pump trucks as well as stacking trays are featured in 20-page Catalog 12.—*Currie Mfg. Co., 1837 W. Grand Ave., Chicago.*

Gravity Wheel Conveyors

All-welded steel, gravity conveyors are available in wide variety of wheel arrangements for maximum suitability to product handled, announces 2-page bulletin. Specifications and construction details are included.—*Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.*

Rotating Bin Units

Segmented circular bins in tiers operating on "lazy Susan" principle are reported to provide new efficiencies in accessible, visible storage.—*Frick-Gallagher Mfg. Co., Wellston, Ohio.*

Hydraulic Hand Truck for Pallets

Single or double-faced pallets can be raised and transported by hydraulic hand lift truck detailed in new bulletin. Model is reported easy to handle and maneuver.—*Revolvator Co., North Bergen, N. J.*

Skid Platforms

A variety of models of skids to which special superstructures may be added is covered in Catalog GP-7. Barrel skids, pry bars and an all-purpose truck are also featured.—*Ironbound Box & Lumber Co., Materials Handling Div., Hillside, N. J.*

New Conveyors

Four new bulletins on conveyor equipment. A portable cleated belt booster is discussed in Bulletin F-27-Al. Bulletin PB64-70-3A describes lightweight medium duty stationary belt booster. Parallel wires form belt of conveyor for baked goods and confections detailed in Bulletin HP-6. Double-Flex chain conveyor is suggested in Bulletin PC18-1A-2 for moving cases, cartons, boxes and cans.—*Island Equipment Corp., 27-01 Bridge Plaza N., Long Island City 1, N. Y.*

Wirebound Boxes

What to Expect from Wirebound Boxes and Crates is title of 16-page illustrated booklet which suggests them to cut container cost, reduce storage requirements, reduce assembly time, packing time and tare weight.—*Wire-*

(Catalogs, Bulletins Continued)

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Concentrated powerful liquid-type sodium hypochlorite disinfectant and germicide. Ideal for food plants. Leaves no film.
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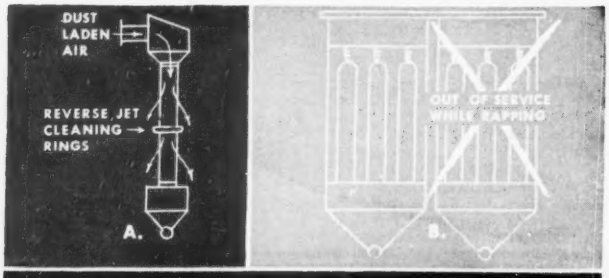

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The **DAY** "Autoclean" Dust Filter provides *continuous-automatic operation* . . . completely eliminating cleaning shut-downs! This results in the low constant back pressures and uniform air volumes necessary for maximum dust collection efficiency.

Figure A shows how reverse jet cleaning rings travel slowly up and down the tubes of the **DAY** "Autoclean" Dust Filter blowing high pressure air back through the felt in a *continuous cleaning action* with a maximum cloth area loss of only 1¾%.

Most other types of filters require shutting down sections for cleaning. This may amount to 50% of the cloth area as indicated in Figure B.

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*Write-to-***DAY** for new "Autoclean" Dust Filter Bulletin No. 491

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Lift Truck Accessories

Attachments, tools, and accessories for lift trucks, cranes and straddle trucks are illustrated and described in 28-page booklet.—*Hyster Co., 2902 N.E. Clackamas, Portland 8, Ore.*

Positioning of Materials

Unnecessary handlings during production operations are avoided when materials are properly positioned, says 14-page book. Suggestions for better positioning are included.—*Lyon-Raymond Corp., 6262 Madison St., Greene, N. Y.*

Retort Loader-Unloader

No damaged cans, elimination of work of 7 to 11 men, saving in cooking and cooling time are advantages reported for retort loader-unloader in 4-page illustrated bulletin.—*Berlin Chapman Co., Berlin, Wis.*

Ball and Roller Bearings

Construction features, selection information and maintenance data on complete line of ball and roller bearings are covered in 112-page Book No. 2550.—*Link Belt Co., 307 N. Michigan Ave., Chicago 1.*

Wire Conveyor Belts

Designed for such purposes as doughnut cooking, handling fish fillets, cereal cooling, vegetable sorting; and blanching, cooling and washing vegetables, bread wrapping, preparing French fries and packaging frankfurters, different weaves of wire cloth belting are illustrated in Bulletin 94.—*Cambridge Wire Cloth Co., Cambridge, Md.*

Pneumatic Handling

Unloading and conveying with pneumatic system is suggested in Bulletin 83.—*Sutorbilt Corp., 2008 E. Slauson Ave., Los Angeles, Calif.*

Flexible Chain Couplings

Dimension data, hp. ratings, stock and maximum bores are among information on flexible chain couplings contained in 16-page Catalog C45-49.—*Morse Chain Co., 7601 Central, Detroit 8.*

Control Equipment

Weight Printer

Operational details, construction features, functions and models available for particular jobs are given in Bulletin P1135 on weight printer.—*Yale & Towne Mfg. Co., Philadelphia Div., Philadelphia 15.*

Industrial Thermometers

Data on liquid-in-glass industrial thermometers is presented in tabular and sectionalized form in Bulletin E. Models, sizes, forms and attachments, with simplified application information, enable user to select proper thermometer.—*Precision Thermometer & Instrument Co., 1407 Brandywine St., Philadelphia 30.*

Process Instrumentation

A time-temperature controller for retorts is featured in Data Sheet 3.2-2. Automatic blancher control is covered in Data Sheet 3.2-5. House organ, *Instrumentation*, Vol. 4, No. 2 has illustrations of controllers installed in candy plant and to regulate potato chip production, as well as articles on solving difficult fluid measuring problems, design of dia-

(Catalogs, Bulletins Continued)

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You can select the *right* truck . . . the truck that *fits your job* . . . from a wide range of Dodge delivery equipment. For example, there's the roomy, rugged, ½-ton panel. There are *"Job-Rated"* chassis, with flat-face or windshield cowls, in three wheelbase lengths, and with nine different G.V.W. ratings.

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SANDVIK STEEL BELT CONVEYORS

SS-28

Catalogs, Bulletins

phragm motor valves and electronic relay for electric proportional control.—*Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Philadelphia 44.*

Temperature and pH Control

Pyrometer which standardizes itself every 45 min., compensates for temperature changes at the instrument, signals need for change in chart paper, ink and dry cells, and compensates for changes in load or Btu. of fuel is featured in house organ, *Modern Precision*, Vol. 9, No. 2. pH controller utilized in neutralizing wastes is also covered. In addition, issue announces availability of catalog on effective neutralization of industrial wastes.—*Leeds & Northrup Co., 4902 Stenton Ave., Philadelphia 44.*

Cutting Costs With Controls

Photoelectric and electronic controls for industrial cost-cutting is subject of 65-page factual book, in which case studies are presented. Index lists applications alphabetically and by industry.—*Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.*

Plant Supplies

Industrial Cleaning

Articles on cleaning meat tote boxes and the necessity for correct concentration of cleaning compound in bottle washing are presented in house organ, *Oakite News Service*, Vol. 33, Nos. 9-10.—*Oakite Products, Inc., 22 Thames St., New York City 6.*

Products for Nutritional Research

Descriptive catalog of products for research in nutrition covers test diets and their ingredients, vitamins, amino acids, media, vitamin supplements, and research biochemicals. Dairy specialties and carotene concentrates are also listed.—*General Biochemicals, Inc., 677 Laboratory Park, Chagrin Falls, Ohio.*

Wood Preservative

Non-toxic wood preservative and fungicide is featured in Vol. 2, No. 10 of house organ, *The Coating Corner*. Other industrial finishes and "spotlight" painting are also covered.—*Brooklyn Varnish Mfg. Co., Inc., Industrial Research Div., 50 Jay St., Brooklyn 1, N. Y.*

Carrot Oil Vitamin Products

In addition to catalog of carotene-containing products for foods and feeds, 34-page booklet gives legal interpretation of carotene use for color and vitamin A, and nutritional relationships between vitamin A and other factors.—*Nutritional Research Associates, Inc., South Whitley, Ind.*

Basic Chemicals Primer

Alkali chemicals and their specialized derivatives and co-products are discussed historically and descriptively in 16-page booklet.—*Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14.*

Spring Clamps

Long life, constant pressure, large range and automatic take-up are features of novel spring clamp detailed in 4-page Bulletin 310. It has wide variety of uses which are illustrated in bulletin.—*Mr. R. P. Coleman, Jr., Hunter Spring Co., Lansdale, Pa.*

Sugar Prospects

Sugar Production Prospects in 1950 and *Sugar Distribution Data for United States* is

(Catalogs, Bulletins Continued)

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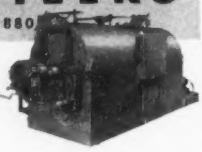

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Catalogs, Bulletins

title of special study which includes interpretive comments.—*Lamborn & Co., Inc., 99 Wall St., New York City.*

Miscellaneous

Wire Rope

Corrosion-resistant preformed stainless steel or monel metal wire rope is offered in variety of strengths and flexibilities for specific purposes in 4-page illustrated bulletin.—*Macwhyte Co., Kenosha, Wis.*

Water Conditioning

Materials and equipment for water softening and conditioning are detailed and pictured in 20-page Bulletin 610. Reasons for water softening are given.—*Elgin Softener Corp., Elgin, Ill.*

Industrial Telephones

New line of sound-powered telephones for industrial use is presented in 8-page catalog. Units operate without batteries or outside power.—*United States Instrument Corp., 409 Broad St., Summit, N. J.*

Automotive Diesel Data

Understanding the Automotive Diesel, a newly offered non-technical treatise, contains 67 pages of text, drawings, graphs and photos on subject.—*Mack Mfg. Corp., 350 Fifth Ave., New York City.*

Laboratory Aids

An article on the analysis of gases, and equipment for analyzing them are features of house organ, *Burrell Announcer*, No. 49-10-36. —*Burrell Corp., 1942 Fifth Ave., Pittsburgh 19.*

Nitrogen Determination

Simplified, rapid method of doing Kjeldahl determinations with newly designed equipment is featured in Bulletin 25-A.—*Hengar Co., 1833 Chestnut St., Philadelphia.*

Industrial Health Services

Insurance company's services in promoting industrial health and safety are detailed in 24-page booklet.—*Metropolitan Life Insurance Co., 1 Madison Ave., New York City.*

Valves

Compressed air-, water-, or oil-operated gate valves are illustrated and described in Bulletin AD-1803. Automatic stop-check valves for boilers are offered in Bulletin AD-1788.—*Crane Co., 836 S. Michigan Ave., Chicago 5.*

Water Conditioning

Processes and equipment for water conditioning in boiler plant and process work are treated in 8-page Bulletin WC-100.—*Graver Water Conditioning Co., Dept. 187, 216 W. 14 St., New York City 11.*

Packings

Wide variety of packings for chemical equipment is covered in bulletin TBPR-619 and TB-918. Socket and ratchet wrenches are offered in Bulletins F-11 and F-12.—*Greene, Tweed & Co., North Wales, Pa.*

Laboratory Appliances

Variety of clamps, holders, supports and flow-control devices is illustrated and described in 24-page book. All are fabricated of Castaloy, non-ferrous, corrosion-resistant alloy.—*Fisher Scientific Co., 717 Forbes St., Pittsburgh 19.*

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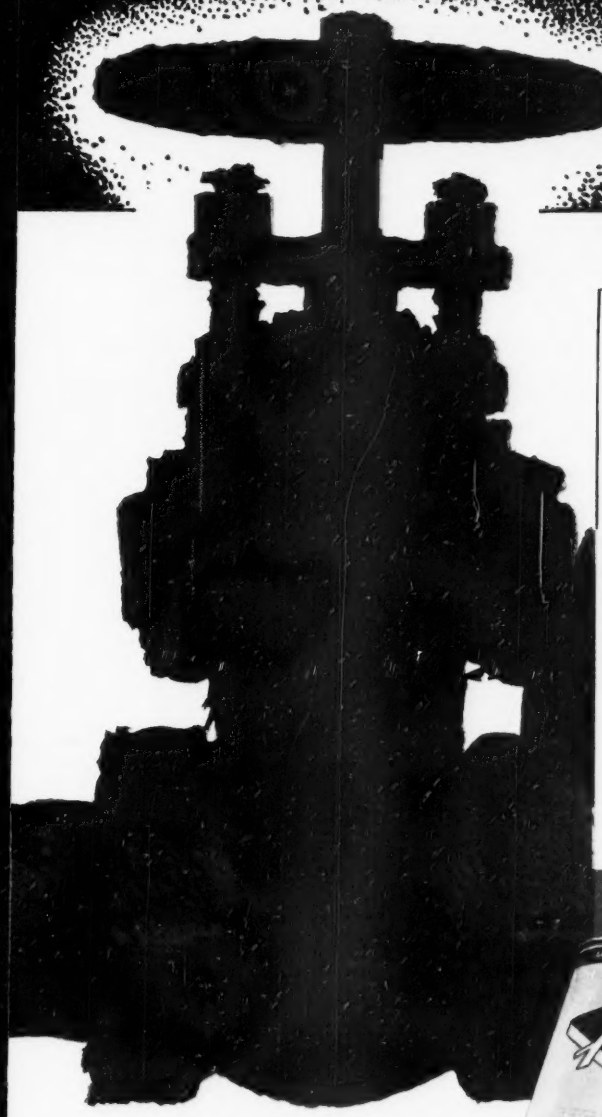

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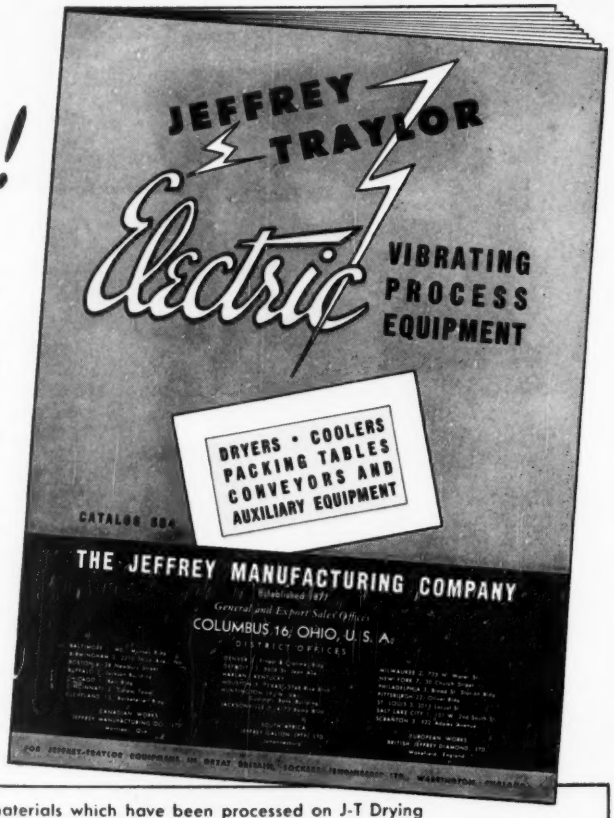

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Patents

Sausages Mechanically Linked—*J. H. Holstein, Chicago.* No. 2,482,911. Sept. 27, 1949.

Dark Oils and Fat Stocks Bleached by Nascent Oxygen in Presence of Phosphoric Acid or Acid Phosphates Preliminary to Treating With Bleaching Earth—*L. F. Henderson and L. H. Libby, to Lever Brothers Co., Cambridge, Mass.* No. 2,483,413. Oct. 4, 1949.

Beheaded Fish Cleaned by Suction as They Move Along Conveyor—*S. K. Lockwood, Carmel and J. L. Smith, Pacific Grove, Calif.* No. 2,483,470. Oct. 4, 1949.

Fish Graded and Separated by Mechanical Means—*H. P. Smith, to Riviera Packing Co., Eastport, Me.* No. 2,483,507. Oct. 4, 1949.

Fish Trimmed, Beheaded and Cleaned by Use of Small Plowlike Device—*H. P. Smith to Riviera Packing Co., Eastport, Me.* No. 2,483,508. Oct. 4, 1949.

Pectous Jellies Made With Pectinylic Acid as Setting Agent—*H. T. Leo and C. C. Taylor, Anaheim, Calif.* No. 2,483,548. Oct. 4, 1949.

Pectous Jellies Made With Pectinylic Acid in Presence of Calcium Ions—*H. T. Leo and C. C. Taylor, Anaheim, Calif.* No. 2,483,549. Oct. 4, 1949.

High Sugar Jellies Containing Pectinylic Acid and Calcium Ions Prevented From Premature Thickening by Addition of Sodium Hexametaphosphate—*H. T. Leo, C. C. Taylor and J. W. Lindsey, Anaheim, Calif.* No. 2,483,550. Oct. 4, 1949.

Vanillic Acid Made From Lignin Material—*I. A. Pearl to Sulphite Products Corp., Appleton, Wis.* No. 2,483,559. Oct. 4, 1949.

Palatable Beverage Made With Water-Soluble Constituents of Leafy Vegetation—*W. R. Graham, Jr., G. O. Kohler and E. E. Frye, to American Dairies, Inc., Kansas City, Mo., and The Quaker Oats Co., Chicago.* No. 2,483,634. Oct. 4, 1949.

Oils and Flowable Fatty Substances Bleached by Continuous Process—*A. A. Robinson, to Standard Brands, Inc., New York City.* No. 2,483,710. Oct. 4, 1949.

Dehydrated Food Product Made to Consist of One Part Raisin and From One to Six Parts De-oiled Orange Peel—*H. M. Dux, Jacksonville, Fla.* No. 2,483,761. Oct. 4, 1949.

Riboflavin Produced During Growth of *Eremothecium ashbyii* in Nutrient Mash Under Agitation and Aeration—*H. R. Stiles, to Commercial Solvents Corp., Terre Haute, Ind.* No. 2,483,855. Oct. 4, 1949.

Butter, Margarine, and Similar Semi-Plastic Materials Recurrently Forced Under Pressure Into Print-Forming Molds Fitted With Valve Ports for Escape of Air During Molding and for Inlet of Air to Operate Ram Which Forces Prints Out of Mold—*K. Alberti, to Lynch Manufacturing Corp., Defiance, Ohio.* No. 2,484,005. Oct. 11, 1949.

Foods Preserved by Freezing in Liquid Air Made in Refrigeration System On Premises—*T. E. Klein, Cranford, N. J.* No. 2,484,297. Oct. 11, 1949.

Cream-Style Corn Consisting of 20 to 40 Percent Whole Kernels and 35 to 55 Percent Finely Divided Corn Kernels, Both Parts Freed From Corn Silks, Cob Tissues and Like by Washing—*R. Cover to The United Products Co., Westminster, Md.* Nos. 2,484,375 and 2,484,376. Oct. 11, 1949.

Non-Hygroscopic, Free-Flowing, Caramel-Flavored Starch Made by Adding Caramelized Sugar Syrup to Starch, Drying Mixture and Grinding to Powder Fineness—*A. R. Berwyn and W. Hach, to Corn Products Refining Co., New York City.* No. 2,484,543. Oct. 11, 1949.

Plastic Sugar and Similar Confectionery Molded by Mechanical Means—*A. W. Barker, Tottenham, London, England.* No. 2,484,670. Oct. 11, 1949.

Oil of Cottonseed Meats Extracted With Single Phase Liquid Solvent Mixture of Methanol and Aliphatic Hydrocarbon to Produce Substantially Non-Toxic Nutritious Meal of Bright Yellow Color—*R. P. Hutchins and W. H. Williamson, to Procter and Gamble Co., Ivorydale, Ohio.* No. 2,484,831. Oct. 18, 1949.

Chewing Gum Base Consisting of Solution of 1-Alkoxy-2-Amino-4-Nitrobenzene in Masticatory Hydrocarbon—*W. O. Snelling, Allentown, Pa.* No. 2,484,859. Oct. 18, 1949.

(Patents Continued)

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Soya Protein Made to Have Controlled Viscosity and pH About 10 When Dispersed in Water—*J. J. Eberl, to Hercules Powder Co., Wilmington, Del. No. 2,484,878. Oct. 18, 1949.*

Non-Hydroxylated, Mixed Glyceride, Non-Drying Oils Hydrolized by Treating With Relatively Small Amount of Boric Acid and Heat—*G. Barsky to E. F. Drew & Co., Inc., New York City. No. 2,484,979. Oct. 18, 1949.*

Dessert Mixture Consisting of Agar-Agar, Dextrose and Sodium Bicarbonate and Free of Curdling Effect on Hot Milk—*F. Gatti, to Gabriel Fabre, New York City. No. 2,485,043. Oct. 18, 1949.*

Fat and Non-Fat Solids of Whole Milk Separated in Centrifuge With Primary and Secondary Zones of Separation—*I. J. Lundal, to Sugar Creek Creamery Co., Danville, Ill. and Cherry-Burrell Corp., Chicago. No. 2,485,209. Oct. 18, 1949.*

Honey-Like Syrup Made From Citrus Fruit Peel—*O. I. Gimewski, one-half to M. Piha, Talbieth, Jerusalem, Palestine. No. 2,485,279. Oct. 18, 1949.*

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Potatoes Sliced in Machine Consisting of Stationary Member with at Least One Knife Next to Discharge Slot, and a Rotor Within Stationary Member Fitted With At Least One Spike Device to Hold Potato Pieces Until Cut by Knife—*G. J. Abbot, Carshalton, England. No. 2,485,344. Oct. 18, 1949.*

Exposure of Perishables to Temperature Conditions Favoring Bacterial Deterioration Indicated by Register of pH Change in Simple Visual Indicators—*J. d'A. Clark, United States Army, River Forest, Ill. No. 2,485,566. Oct. 25, 1949.*

Insect and Related Parasite Infestation in Stored Grain, Seeds and Milled Products Controlled by Spraying With Liquid Containing Crotyl Chloride—*J. Kamlet, to Publicker Industries, Inc., Philadelphia. No. 2,485,695. Oct. 25, 1949.*

Deodorized Soya Oil Inhibited Against Oxidation and Flavor Reversion by Addition of One or More Monoesters of Citric Acid—*R. H. Neal, C. M. Gooding and H. W. Vahlteich, to The Best Foods, Inc., New York City. No. 2,485,631. Oct. 25, 1949.*

Glyceride Oil Stabilized by Addition of Not More Than 0.1 Percent of Monoester of Citric Acid—*H. W. Vahlteich, R. H. Neal and C. M. Gooding, to The Best Foods, Inc., New York City. No. 2,485,632. Oct. 25, 1949.*

Food Product Made to Consist Chiefly of Soya Oil Containing Not More Than 0.1 Percent of Monoester of Citric Acid—*C. M. Gooding, H. W. Vahlteich and R. H. Neal, to The Best Foods, Inc., New York City. No. 2,485,633. Oct. 25, 1949.*

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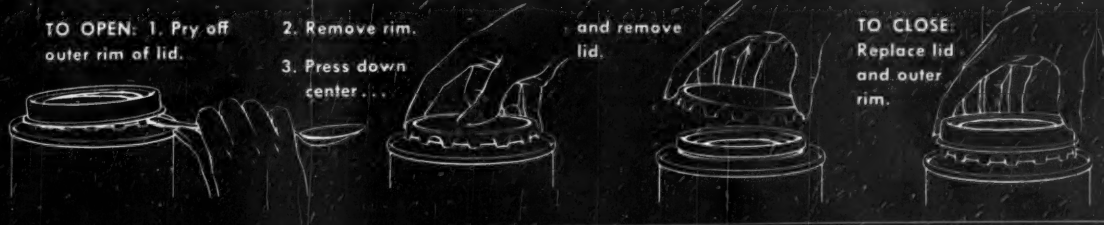

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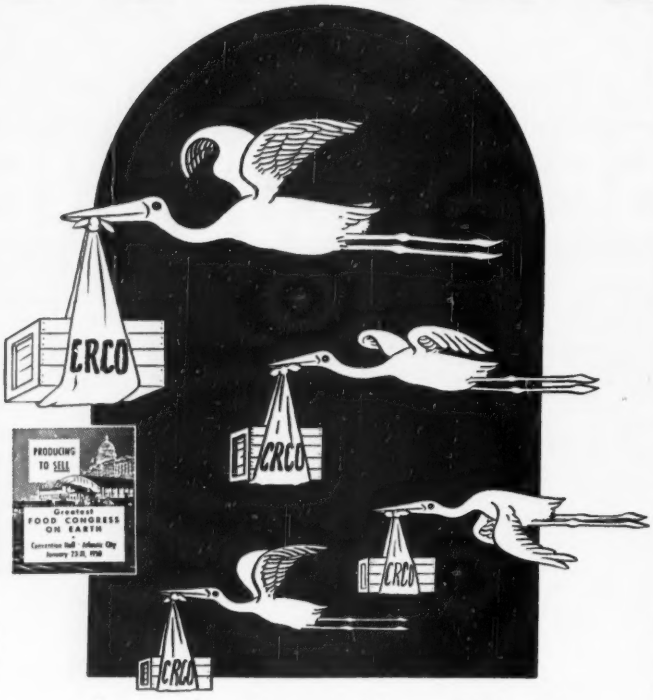

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Butter and Margarine Compositions Stabilized by Addition of 0.05 to 1.5 Percent by Weight of Diester of Citric Acid—*H. W. Vahlteich and R. H. Neal, and C. M. Gooding, to The Best Foods, Inc., New York City. No. 2,485,634. Oct. 25, 1949.*

Potato Chips and Like Fried in Glyceride Oil Containing Monoalkyl, Monoalkylene, Dialkyl, or Dialkylene Esters of Citric Acid— *R. H. Neal, C. M. Gooding and H. W. Vahlteich, to The Best Foods, Inc., New York City. No. 2,485,635. Oct. 25, 1949.*

Edible Nut Meats Stabilized by Treatment With Monoalkyl, Monoalkylene, Dialkyl or Dialkylene Esters of Citric Acid; Alkyl and Alkylene Group Having at Least 8 Carbon Atoms—*R. H. Neal, H. W. Vahlteich, and C. M. Gooding, to The Best Foods, Inc., New York City, No. 2,485,636. Oct. 25, 1949.*

Cheese Made to Contain Monoalkyl, Monoalkylene, Dialkyl, and/or Dialkylene Esters of Citric Acid—*C. M. Gooding, R. H. Neal, and H. W. Vahlteich, to The Best Foods, Inc., New York City. No. 2,485,637. Oct. 25, 1949.*

Margarine Made to Contain ¼ to 2 Percent of Mixture of Mono-Aliphatic, Di-Aliphatic, and Tri-Aliphatic Citrates With Aliphatic Groups Containing at Least 14 Carbon Atoms and ¼ to 6 Percent of Aliphatic Monocarboxylic Acid Monoesters of Glycerol; Carboxylic Residue Having at Least 14 Carbon Atoms—*C. M. Gooding, H. W. Vahlteich, and R. H. Neal, to The Best Foods, Inc., New York City. No. 2,485,638. Oct. 25, 1949.*

Edible Glycerine Oil Composition Made to Contain Mixture of Mono-Aliphatic, Di-Aliphatic and Tri-Aliphatic Citrates in Which Aliphatic Groups Selected From Alkyl and Alkylene Groups Have at Least 14 Carbon Atoms—*H. W. Vahlteich, C. M. Gooding, and R. H. Neal, to The Best Foods, Inc., New York City. No. 2,485,639. Oct. 25, 1949.*

Food Composition Made to Consist of Glyceride Oil Containing Substantially no Tocopherol, 0.002 to 0.2 Percent of Tocopherol, and 0.002 to 0.2 Percent of Monoalkyl or Monoalkylene Ester of Citric Acid—*H. W. Vahlteich, C. M. Gooding, and R. H. Neal, to The Best Foods, Inc., New York City. No. 2,485,640. Oct. 25, 1949.*

Milk Evaporated in Unit With Cylindrical Shell Having Concave Bottom and Side Wall Fitted With Series of Annular Steam Coils Within Shell and Extending Adjacent to Side Wall in Lower Portion Leaving Vertical Central Space Open—*A. W. Baumann, Chicago. No. 2,485,689. Oct. 25, 1949.*

Histidine and Leucine Prepared From Precipitate Resulting From Treating Protein Acid Hydrolysate With Dichlorobenzene Sulphonic Acid, Using Acetone to Dissolve Leucine, Leaving Histidine Undissolved—*L. Butturini and G. Bernini, to Carlo Erba S. A., Milan, Italy. No. 2,485,859. Oct 25, 1949.*

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—*End*

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Frozen Foods Sprout

—Continued from page 57

uration point in retail outlets. It is estimated that about 90,000 retail stores now handle frozen foods, out of a total of 360,000 food outlets. However, a great many of these 360,000 are small stores, which are unlikely to ever be frozen food distributors.

The latest statistical survey on the subject is a recent one by the Bureau of Labor Statistics. In the 56 cities in which BLS regularly collects food price information, the agency found that almost twice as many stores had display cabinets for frozen foods in 1949 as had them in 1944. An important point: Most of the new display cabinets are much larger than those installed five years ago, and on-premise storage capacity has also grown greatly.

Another survey made by the Department of Agriculture's Fruit & Vegetable Branch turns up some interesting figures on the distribution of frozen orange concentrate alone. In April, 1949, 16.9 percent of a national sample of retail food outlets handled the product. In August, however, 24.5 percent were selling the item.

Thus, the growth of frozen foods now represents the result of two trends: (a) Increasing consumer preference, and (b) increasing availability. So it may be some time before canners and other food preservers can determine for sure how much the frozen product will cut into their sales, as compared with the competition frozen fruits and vegetables now give to the fresh products.

Compared To Total Foods

At the moment, Census figures indicate pretty clearly the contrast in size of the frozen food industry, as compared with canning and other preserving processes. In 1947, the total for canning, preserving and freezing was $916,600,000, compared to $319,100,000 in 1939. Frozen foods amounted to $59,300,000 in 1947 against $4,600,000 in 1939.

The above data shows "value added by manufacture," which the Census Bureau describes as "the best Census measure of the relative economic importance of manufacturing in different industries." The figures indicate the contribution of manufacturing and processing establishments to the value of the finished products. It is calculated by subtracting the cost of materials, supplies, containers, fuel, purchased electric energy, and contract work from the total value of shipments.

Thus the figures show that while frozen foods in 1947 were only 6 percent of the total canning, preserving, and freezing industry, still, it has come up from 1.4 percent in 1939. (These figures, too, do not include the fast-growing frozen concentrate production.)

One thing that is not generally realized is that a good share of the frozen food business—especially fruits—is merchandised in so-called institutional sizes. These are the large-quantity containers used by other food processors, bakers, as well as hotels, restaurants, and other institutions.

The figures are not given, for instance, to show the relationship between frozen and canned strawberries because the frozen product is many times that of the canned. Again, while canned red tart cherries far outsell the frozen in consumer sizes, about twice as many pounds are frozen for industrial and institutional use as are packed for these users in cans.

Distribution Changes

One important development in frozen foods during the past year is the change-over of some leading freezers to direct distribution in some areas. Some of the largest have dropped their wholesalers or jobbers in favor of setting up their own distributing organization.

This development—and others, such as the increase in direct buying by chain stores—is brought on by the increasing competition both within the frozen food industry itself, and between frozen foods and other processed foods.

The aim is to whittle distribution costs as much as possible in order to make retail prices as competitive as possible. The year saw this kind of competition get underway in earnest. There are indications, however, that this trend is slowing down and that 1950 may see some reversals.

No one is guessing whether or not frozen foods generally will drop down to new price levels. It does seem certain, however, that if large supplies of fruits and vegetables are available in 1950, frozen food packers will take steps to maintain as sharp a competitive price structure as they can in relation to lower-priced fresh produce.

Outlook By Product

The big sellers among the various frozen products are green peas, strawberries, cherries, lima beans, spinach, and snap beans. The pack of the largest selling frozen item—green peas—amounted to 17 percent of the canned pack of peas. On other items, however, production of frozen compares far more favorably. For instance, frozen lima beans were 101.5 percent of

canned limas in 1948; frozen cherries 72.3 percent of canned; spinach, 27.7 percent of canned.

One of the most significant ups-and-downs in frozen food history occurred in pre-cooked foods—chile-con-carne, prepared dinners, and the like. During 1946 and 1947, production of these items zoomed, but they slid right back down again. They got their splurge from several factors—the aftermath of war psychology, the novelty of frozen foods, and particularly from the entry of scores of new firms into the field. But with the return of more normal consumer buying, and with the stabilization of the industry through the exit of marginal operators, the specialty items dropped back in importance.

However, while pre-cooked dinners may remain a minor factor, there is no doubt that a number of pre-cooked specialties are gaining a solid foothold. For instance, in local markets, certain freezers are establishing a solid consumer demand for such items as frozen pies, clover-leaf rolls, blueberry muffins, cookies and other baked goods. Similarly, a small but steady demand for such items as frozen French fried potatoes has developed.

—End—

Stored Apples

—Continued from page 85

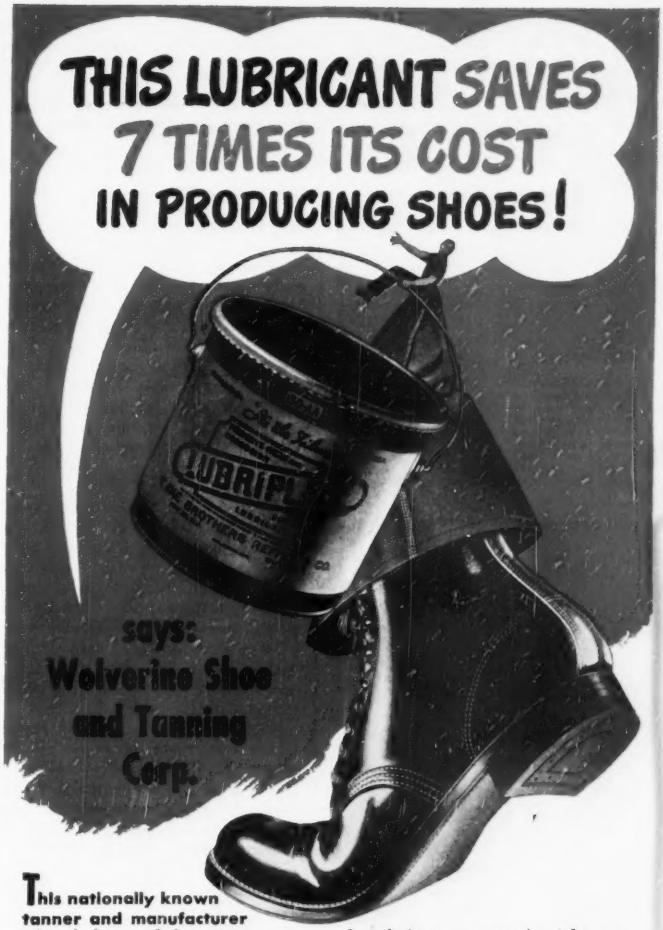
qualities than do green apples of the same variety and lot.

In Table V are some data covering three varieties of apple tested in February 1946. An increase of 2.0 to 2.5 percent in sugar content is shown in the well-colored apples as compared with the green ones.

Correlation between pressure test and degree of maturity, as evidenced by color, is shown in representative data (Table VI) covering a large lot of apples, 1946 crop, examined in April 1947.

In the case of apples showing partial blush, the pressure tests on the blushed sides are higher than those on the green. Thus, an increase in maturity up to the optimum for storage purposes is normally accompanied by an increase in pressure, sugar content, and skin color.

Uniformity as to maturity is highly important. When individual apples of one variety show considerable pressure differences before storage, the keeping quality of the lot is adversely affected from at least two standpoints: (1) Apples of low pressure deteriorate quicker than those which are firm; and (2) when apples of one variety, but of extremes of maturity, are packed together, or when different



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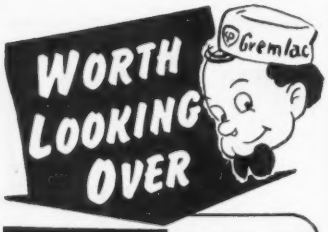

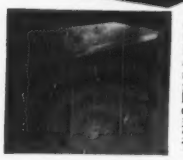

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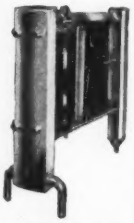

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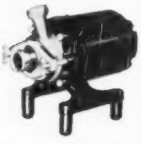

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apple varieties are packed together, the storage life of the lot may be reduced as much as 50 percent. This has been shown by Smock[8] to be due to the stimulating effect of the gases (emanating from ripe apples) upon the respiratory activity of those which have not yet reached a significant point in the increase toward the respiratory peak. Even when as few as 1 percent of apples of high respiratory activity were present, a pronounced stimulation in the respiration of the balance of the apples was noted, leading to early decay. The extent of this effect is dependent upon the apple varieties and stages of maturity involved. However, a combined effect of this factor and others, such as mold and bacterial contamination, often results in early decay of lots of apples which under conditions of more homogeneous maturity might be expected to keep well.

Color Development In Storage

Apples picked immaturely do not reach full maturity in storage. They remain sour and astringent, and do not significantly improve in skin color. Their storage life is less than that of properly mature apples. They are more subject to scald, wilting, and bitter-pit than is well-matured stock. In Table VII is shown the extent of bad scald and decay in apples stored at immature and mature stages.[7]

Figs. 1 to 4 illustrate the changes which take place in apples of two stages of maturity during storage. Fig. 1 represents Rome Beauties picked too early for satisfactory storage for 6 mo. at 32 deg. F. The fruit has a vivid leaf-green area on the shaded side, with considerable red color on the sunny side. The cross section shows an apparent green color in the fruit flesh. This description applies to the apples when they were put in storage.

Fig. 2 illustrates the same apples at the end of 6-mo. storage. They had a dull-brown instead of a healthy red external appearance. A cross section shows that several layers of cells immediately below the skin, and cells of the skin itself, have ceased to function (are "dead"), and have become discolored (incipient rot).

In contrast, Fig. 3 represents Rome Beauty apples picked after the leaf-green had disappeared and the normal yellow ground color of the variety had developed. A cross section shows that the green color had disappeared from the fruit flesh also.

After 6-mo. storage, the apples (see Fig. 4) showed no loss of normal color or any discoloration. There was a deepening of the yellow in the ground color which indicated continuation of the ripening action. Cross sections also showed no discoloration or browning of the fruit flesh. Instead, the yellow tint in the flesh increased, as is characteristic in the maturing of Rome Beauty apples.

References

1. Fisher, D. F., "Handling Apples From Tree To Table". USDA Circ. No. 579, Jan. 1941.
2. Haller, M. H., Lutz, J. M., and Mallison, E. H., "The Relation of Firmness To Ripeness of Eastern-Grown Apples". USDA Circ. No. 579, Jan. 1941.
3. Haller, M. H., "Fruit Pressure Testers and Their Practical Application." USDA Circ. No. 627, Nov. 1941.
4. Haller, M. H., "Picking Maturity of Apples." USDA Circ. No. 711, Oct. 1944.
5. Magness, J. R., et al., "The Ripening, storage and Handling of Apples." USDA Bul. No. 1406, Aug. 1926.
6. "The Grade and Condition of Some Commercial Packs of Michigan Apples in Mid-Winter." *Michigan State College Quarterly Bulletin*, Vol. 23, No. 4, May, 1941.
7. Ramsey, H. J., McKay, A. W., Markell, E. L., and Bird, H. S., "The Handling and Storage of Apples in the Pacific Northwest." USDA Bul. No. 587, Sept. 1917.
8. Smock, R. M., "The Influence of Stored Apples on the Ripening of Other Apples Stored With Them." Cornell University Agricultural Expt. Sta., Bul. 799, June, 1943.

The effect of picking, handling and temporary storing methods upon storage life of apples, and suggested improvements in these methods, are discussed in Part II of this article to be published in a subsequent issue of FOOD INDUSTRIES.

—End—

Frozen Foods Sped

—Continued from page 61

require. Instead, all orders are taken on a pre-order basis by telephone or solicitation.

The orders are packed at the local plant or cold storage warehouse and are delivered on the regular ice cream-route trucks or the special frosted food trucks. As stated, the type of truck employed depends on the volume of the orders, also on the factors making for the best delivery within the limits of the working day and at the least truck mileage. In short, efficiency and economy are the criteria in load dispatching.

Southern Dairies has found no substantial problem in delivering frosted foods from its standardized refrigerated ice cream-route trucks. The merchandise is just as easily available to the deliveryman. And since all of the orders are pre-packed, it is just as simple to handle the frosted foods as the ice cream.

With the delivery of both ice cream and frosted foods on the same truck, there is one factor that should tend to reduce the overall distribution cost of both items—that is, the ice cream and frosted foods businesses have their peaks at opposite seasons of the year. Thus, the two products have a complementary value, enabling those trucks that carry both to operate more days per year.

Some idea of the value of this combination may be had from the fact that the company makes only about 60 percent as many ice cream deliveries in the winter months as in the summer.

Yet this is not meant to imply that the number of trucks operated is reduced 40 percent when making ice cream deliveries alone. There is the additional factor that the trucks undergo major repairs and repainting during the winter season. That takes some out of service. But the balance, if operated in the winter with ice cream only, are merely run less frequently.

Now, however, with the addition of the frosted foods on the ice cream trucks in the winter, these carriers are used to a much greater extent. And therein lies the economy of the combined ice cream and frosted food loads.

The combination-load trucks and the special frosted food trucks are of the same size and have refrigerated bodies of the same general design. Both are painted the same colors, and both carry the Southern Dairies name in small letters on the cab door over a seal design bearing the word, "Sealtest", the brand name of the National Dairy Products Corp., of which Southern Dairies is an operating subsidiary.

In their primary panel lettering, however, they differ (see photos). The ice cream truck bodies that also carry the frosted food items are prominently lettered "Sealtest" on front, sides, and rear. In contrast, the special frosted food trucks display the dominant legend, "Seabrook Farms Quick Frozen Foods."

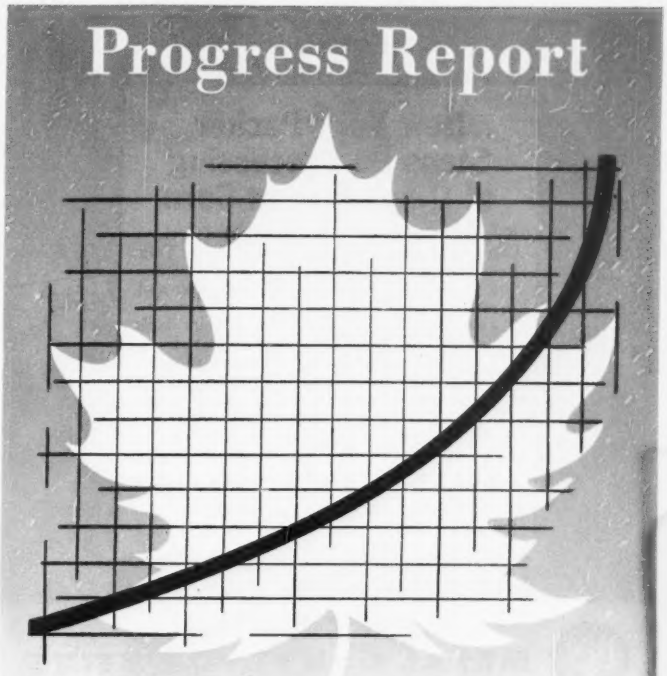
—End—

Five Steps Must Be Taken

—Continued from page 72

Suppose that F&DA has developed from its proceedings fairly dependable and reasonably adequate answers during the four stages of inquiry which have been described. There will still remain, for the fifth step, the most difficult question of all and one which F&DA may find most embarrassing. Let us take a specific example:

Growing tomatoes with even the best spray practice inevitably produces a product for the factory which is not entirely free from insect infestation. But the more spray used, the less likely is this residue of insects to be large and serious. So the maker of tomato products is caught between two opposing desires. He wants his products to be as free from insect fragments as possible. At the same time, he is anxious to have insecticide residues approach the absolute minimum, reaching zero if possible. Actually, when he gains one objective, he is al-



In the more than 30 years that we have been producing Alva imitation Maple, the sales of this product have been climbing steadily year after year.

Once specified, Alvamaple has seldom been replaced by a competitive product. The reason for this success story is not that Alva Maple is sensational or radical. It's just its downright, true-to-the-tree goodness.—The finest match of the flavor goodness of real sugar maple for every use by bakers, confectioners, ice-cream makers, extract and syrup manufacturers.

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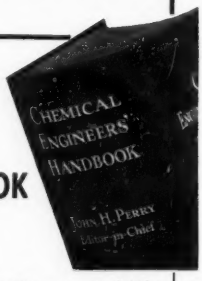

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most sure to be forced farther away from the other.

One very friendly but frank food executive summed up this situation simply: "Would F&DA rather have bug powder or bug fragments in the catsup?" Of course, that is an oversimplification. But it does rightly point to a problem that is not easily solved.

Sincere effort by all interested parties will not completely solve this or any other phase of the problem soon. But such effort will take the government and the industry a long way forward. To the extent that there is sincere and constructive effort, there will be progress.

—*End*—

Plug Those Leaks

—Continued from page 45

waste control, such as "scrap" reports on a weekly or monthly basis, which show whether you're on the up or down grade? Are inspection procedures adequate? Are standards known by everyone, to prevent dumping of salvageable material?

Do your people know the actual cost represented by wasted material?

Have possibilities been overlooked for re-using surplus or waste items within the company? Or outside the company?

Can different handling methods cut down on spoilage?

Do you have any individual working at a job that requires *less* skill than he has? If this is so, can he advantageously be transferred to a higher type of work?

Do you have any worker who's not trained to his full capacity for his job?

Do you overlook the basic ingenuity possessed by most people by not inviting suggestions and discussion with the group?

Does your company have a formal suggestion system? If so, have you failed to encourage your people constantly to contribute?

Could you improve your system of scheduling, and so provide a full day's work each day for each worker?

Have you neglected to make it clear to the group at large that idleness is harmful to the total group effort?

Do "slow starters" and "early finishers" cut down on group accomplishment?

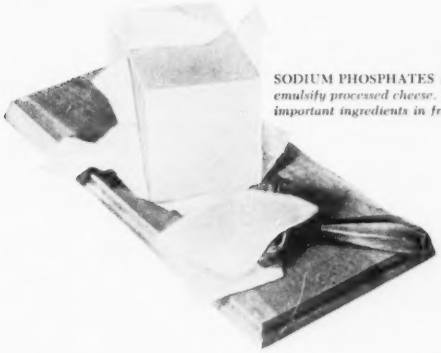
Do you detect needless waste of machines? Would it be worthwhile to check whether the department's equipment is being used productively through the entire workday?

Does poor maintenance, or some other controllable cause, take your equipment out of action unnecessarily?

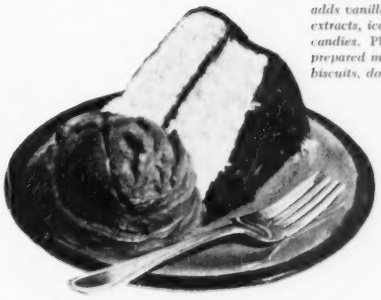
Is your equipment giving less than

NIFOS*-T *is one of many Monsanto chemicals used to control insect pests that attack growing vegetables, fruits.*

SODIUM BENZOATE *preserves foods;* PHOSPHATES *(mineral supplements) add desirable enrichment to bread.*



SODIUM PHOSPHATES *add nutrients, help emulsify processed cheese.* PLASTICIZERS *are important ingredients in free-film wrappers.*



ETHAVAN,* *properly formulated, adds vanilla-like flavor to extracts, ice cream, confections, candies.* PHOSPHATES *in prepared mixes make better cakes, biscuits, doughnuts.*

SANTOCEL,* *with higher insulating value, permits thinner freezer walls; adds to inside storage space; doesn't increase outside case dimensions.*

Let's eat

The food industry has made "let's eat" two of the most popular words in the English language.

Monsanto, too, helps by supplying chemicals used throughout this important industry – from the growing of food to its final packaging and sale.

Many fruits and vegetables, for instance, thrive when protected against insects by formulations of Monsanto agricultural chemicals.

Processed cheese is made with Monsanto sodium phosphates which act as emulsifiers; make cheese smooth. Free-film wrappers, containing Monsanto plasticizers, protect many foods against contamination.

Jellies and jams are preserved with Monsanto sodium benzoate. Bread is enriched with Monsanto mineral supplements.

Cake à la mode tastes better because of Monsanto products. Monsanto phosphates help make cake light, fluffy – ice cream gets its delicious vanilla-like flavor from Monsanto Ethavan.

Frozen food cases, with wall insulation of Monsanto Santocel, provide more storage space, keep frozen foods fresh.

To the Food Industry . . . These are only a few of the many instances where "let's eat" involves Monsanto Chemicals. If you are interested in any phase of the food industry – growing, cleaning, processing, formulating, packaging or sales – write Monsanto Chemical Company, 1737-A South Second Street, St. Louis 4, Missouri, or return the coupon. In either case, please outline your interests as specifically as possible.

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Hanging on to Money

Can the company buy in larger quantities any materials or supplies you use, in order to take advantage of quantity discounts?

Can the company buy in smaller quantities—to avoid waste, spoilage?

Is the company paying for a quality you are not getting—service that does not materialize, or quality that has fallen off?

Is there any type of service your department needs that would "pay for itself?"

Are you holding on to old equipment to avoid the expense of new—when the change might be a saving in the long run? If this is a possibility, can you work through your superior to arrange a demonstration of the equipment?

Have you been checking employee errors to determine the money-loss?

Front-Line Action

Once your front-line people understand this approach to cost-cutting, they can get down to brass tacks in their own departments.

It is obviously important to win the cooperation of rank-and-file employees. They are in a position to help if they go along with management, which to them is front-line supervision. They are in a position to nullify the effort if they do not go along.

The only known way to get cooperation, especially in this kind of undertaking, is through participation. A mere passive following out of orders from above is not even a neutral position. It may actually hinder the effort.

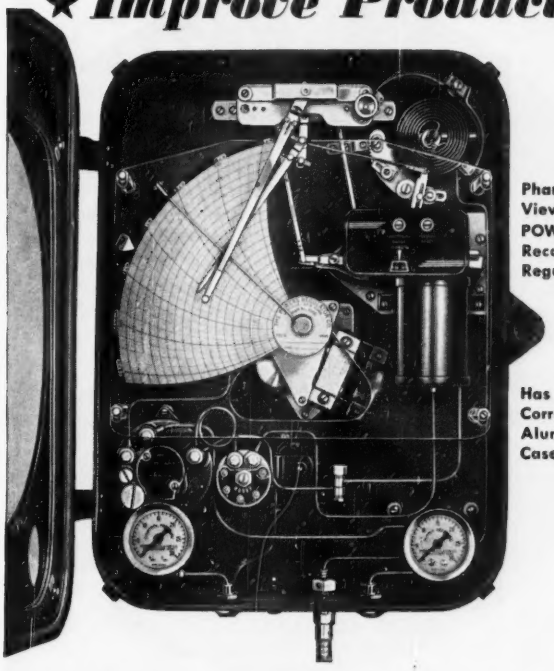
This is the way one foreman went about it: He asked his people to get together for an informal chat. He told about the report that he had received as a member of the supervisory staff. He described the company's position. (If the actual story is one that can be garbled, it is well to give the supervisors brief but exact information to pass on to the subordinates.)

He made it clear that he was not talking about layoffs. But he also spelled out the fact that needless expenses had to be eliminated. He then asked for suggestions on how costs might actually be reduced in the department.

By going through the questions relative to Effort, Material, Talent, Time and Money—which had been detailed in his own management meeting—he got his group to come up with a number of workable ideas. And equally important, he won their willingness to accept—to enthusiastically receive—the cost cutting innovations.

—*End*

★ REDUCE COSTS
★ Improve Production



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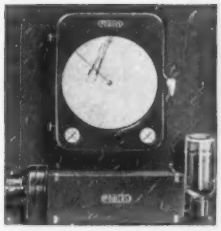

ABOVE: POWERS WET and DRY BULB RECORDING REGULATOR. Also available as a recorder only. Unit consists of two pen recording thermometer, water pan and motor blower causing sufficient circulation to give proper wet bulb readings.

ABOVE: POWERS TIME CYCLE RECORDING REGULATOR. Cam with cam follower operates steam control valve to correspond with any pre-determined time temperature schedule. Recording thermometer chart record provides a check on the operation of the control.

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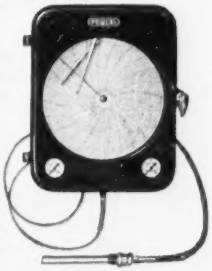

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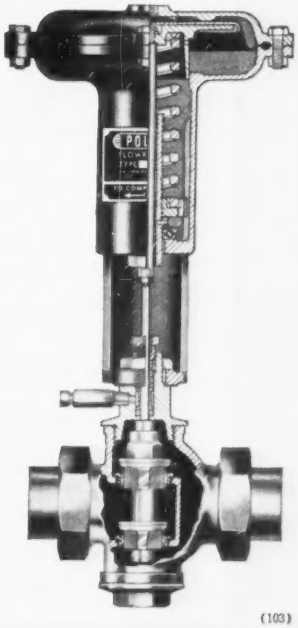

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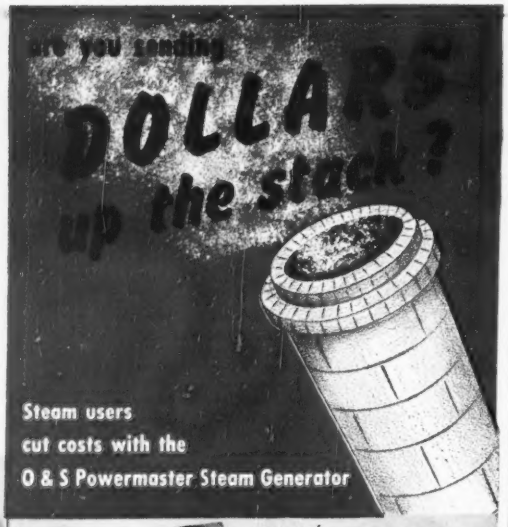
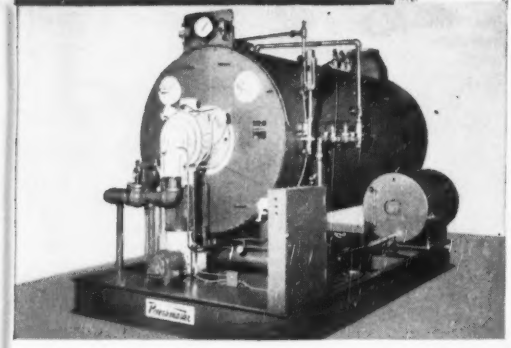
ABOVE: POWERS FLOWRITE VALVE





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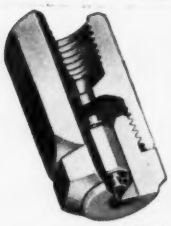

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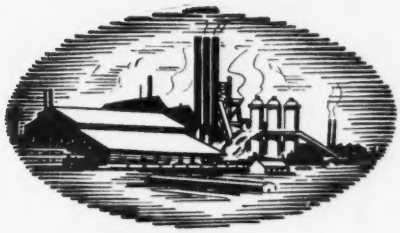

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- Since 1900 we have cut 18 hours from our average work week—equivalent to two present average workdays.

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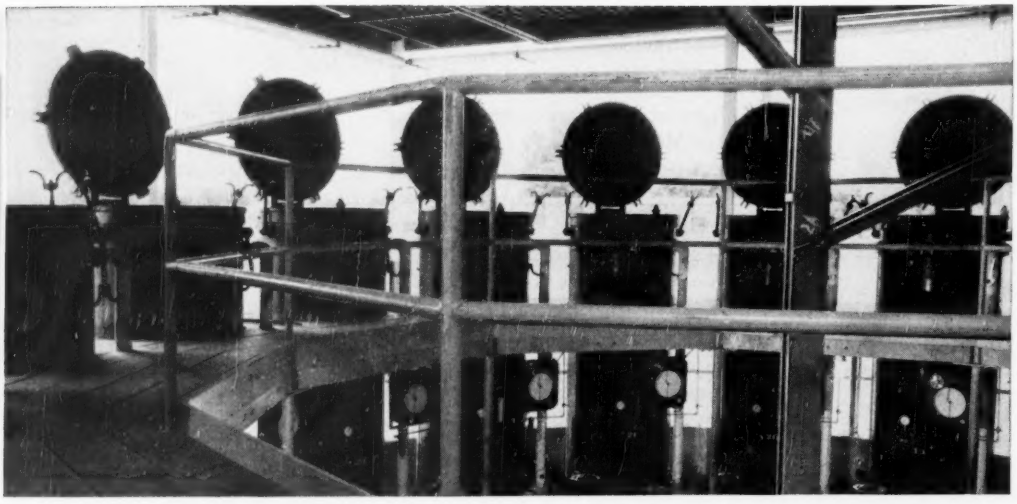
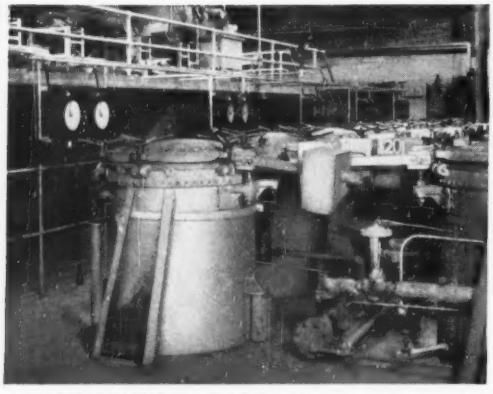
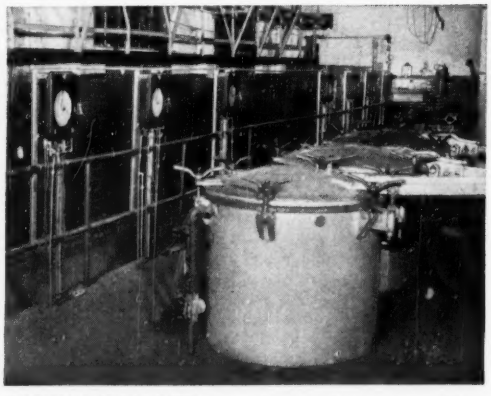


1. GLENCOE, MINN. PLANT—Taylor Controls provide automatic time and temperature control of the cooking cycle—automatic vent and drain—and automatic blow-down.



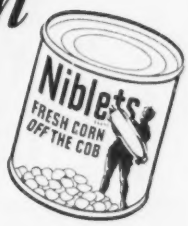
2. BLUE EARTH, MINN. PLANT—Peas and corn are steam cooked by automatic control of time and temperature, blow-down, venting, cooling and draining.



3. LE SUEUR, MINN. PLANT—Canned peas and corn processed here by steam cook with automatic temperature control and automatic pressure cooling.

its famous name with

PROCESS CONTROL



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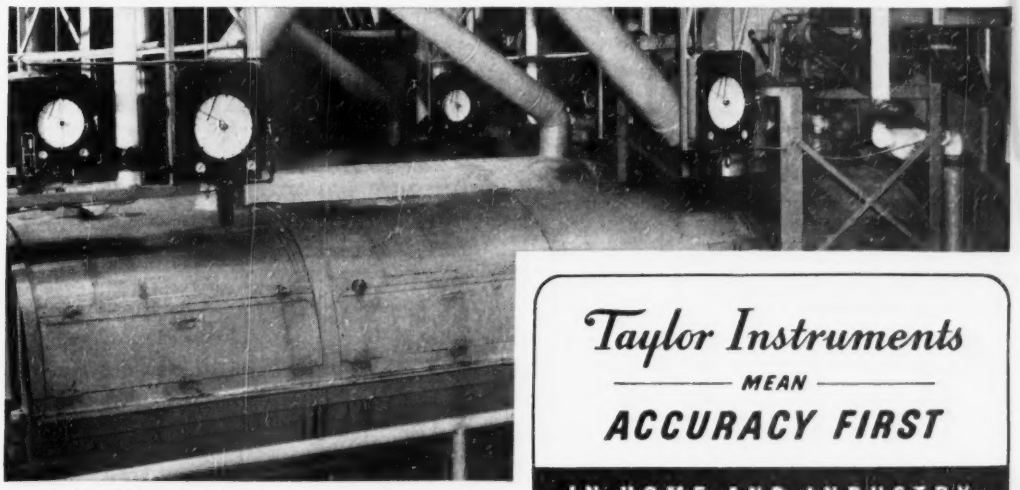

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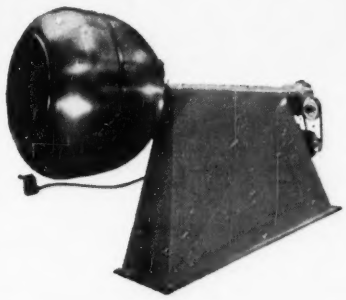

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Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil, and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

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NEW ADVERTISEMENTS

must be received by January 23rd to appear in the February issue.

Address copy to the Classified Advertising Division

FOOD INDUSTRIES
330 West 42nd St., New York City

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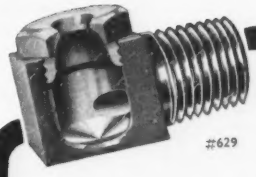

In many Food Processing plants Monarch Spray Nozzles are used to . . . .

WAX FRUITS
RINSE VEGETABLES
POWDER MILK
DRY EGGS
WASH FILTER CAKE
HUMIDIFY BANANA ROOMS

Remember

if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

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The advertising rate is $9.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

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NEW ADVERTISEMENTS received by 10 A. M. January 23rd will appear in the February issue subject to limitations of space available

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Wanted by old established national manufacturer whose products are well-established in large and medium bakeries. Exceptional salary and growth for man thoroughly experienced and willing to travel when required.

The man we are looking for is probably now employed and drawing a good salary. Our continued growth makes for this opening to relieve our president.

Please state fully in strictest confidence your experience, age, connections, and earnings.

P-1857, Food Industries
330 W. 42nd St., New York 18, N. Y.

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Excellent opportunity with nationally known food manufacturer in southern Ohio plant. Applicants must have had considerable experience directing food processing and packaging operation or one of similar nature. Age 30 to 45 preferred. In writing give experience, background, education and salary requirements.

P-1779, Food Industries
520 N. Michigan Ave., Chicago 11, Ill.

REPLIES (Box. No.): Address to office nearest you
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CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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c. Nutrition
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Highly qualified instructors with practical experience as well as European and American degrees in their respective fields.

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WANTED
Single Machines or Entire Plants

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Phone: Yonkers 5-0442

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Large stock of stainless steel tanks and kettles

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3—7500 gal. Steel Kettles, with copper coils, closed Agitated, 10' dia. x 12'6" deep, 15' overall height.
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1—Kane 7 H.P. Gas Fired Boiler Complete.
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in good operating condition

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1—#120 Sprague Sells Syruper.
2—6 Pkt. M. & S. Can Fillers.
1—Indiana Paddle Finisher.
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2—Vacuum Pumps, Nash Engineering Company.
2—#00B Ingersoll Rand Steam Jet Booster.
3—Savage M M Beaters, 200# Capacity.
2—2000# Chocolate Melting Kettles.
1—New England Chocolate Pump.
2—32" Kihlgren Stringers.
1—80 Quart York Ice Cream Freezer with 7½ H. P. Motor.
1—Bunn 10" Center Tie Double Wrap Machine.
1—6 Pkt. Model F Divider with Variable Speed Drive.

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Kinney High Vacuum Pump, Model DVD 18-1420. Capacity 702 cubic feet per minute. Also motor controls and 40 HP, 2 phase—60 cycle, 220-440 volt motor.

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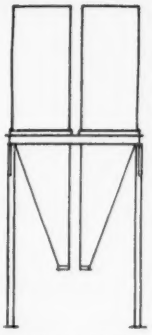

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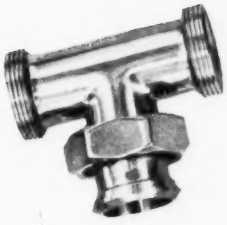

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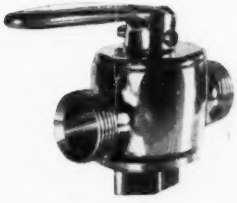

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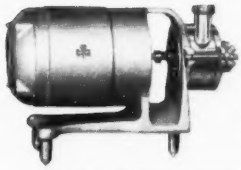

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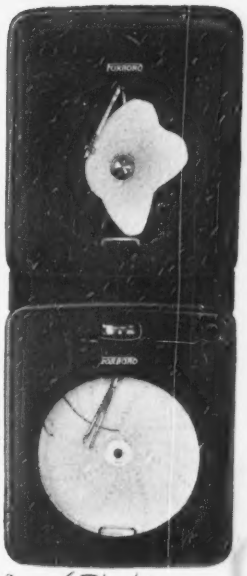

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	In 1 Year	In 10 Years
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6.25	325.00	3,607.54
7.50	390.00	4,329.02
9.38	487.76	5,416.97
12.50	650.00	7,217.20
15.00	780.00	8,660.42
18.75	975.00	10,828.74

Savings chart. Plan above shows how even modest weekly savings can grow into big figures. Moral: Join your Payroll Savings Plan next payday.

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BUY YOUR BONDS

THROUGH PAYROLL SAVINGS

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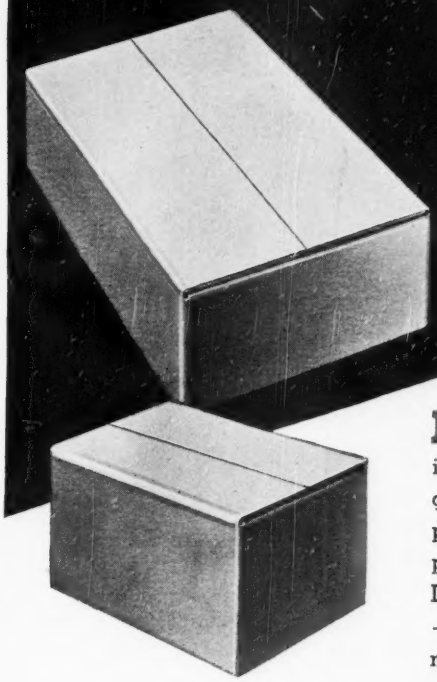

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